CONSEIL PERMANENT INTERNATIONAL POUR
L'EXPLORATION DE LA MER

RAPPORTS
ET
PROCÈS-VERBAUX DES RÉUNIONS

VOLUME LVII

SCIENTIFIC REPORT OF THE
NORTH-WESTERN AREA COMMITTEE
FOR 1926—27

(RAPPORT ATLANTIQUE, SECTEUR NORD-OUEST, 1926—27)

PUBLISHED BY

PROFESSOR JOHS. SCHMIDT, PH. D., D. SC.
MEMBER OF THE DANISH COMMITTEE FOR THE STUDY OF THE SEA
CHAIRMAN OF THE NORTH-WESTERN AREA COMMITTEE

EN COMMISSION CHEZ
ANDR. FRED. HØST & FILS
COPENHAGUE

Prix: Kr. 10.00.

Mai 1929

CONTENTS

HAROLD THOMPSON: General Features in the Biology of the Haddock *(Gadus aeglefinus L.)* in Icelandic Waters in the Period 1903—1926.

R. SPÄRCK: Preliminary Survey of the Results of quantitative Bottom Investigations in Iceland and Faroe Waters, 1926—1927.

ÁRNI FRIÐRIKSSON: Age-composition of the Stock of Cod in East Iceland Fjords during the Years 1925—1927.

Å. VEDEL TÅNING: Plaice Investigations in Icelandic Waters.

GENERAL FEATURES IN THE BIOLOGY OF THE HADDOCK (*GADUS AEGLEFINUS* L.) IN ICELANDIC WATERS IN THE PERIOD 1903—1926

BY

HAROLD THOMPSON, M. A., D. SC.

CONTENTS

	Page
Section I. Previous Work on Icelandic Haddock	5
— II. Scope of the Material now available	5
— III. The Efficiency of the Otter Trawl in the Sampling of Haddock Shoals	7
— IV. The Methods employed in the Treatment of the Material, and some Results	11
1. Resolution of the Statistics of Haddock Catches into component Age Groups	11
2. Calculation of Growth Rates of Haddock from the Annual Zones on the Scales	12
3. Estimation of the Relative Frequency of the various Year Broods	19
— V. A Brief Survey of the Hydrographic Conditions at Iceland	20
— VI. Sub-division of the whole Icelandic Plateau into Natural Sub-areas	23
— VII. The Growth Rates found for Icelandic Haddock	24
1. From the actual measurement of Specimens	24
2. From intermediate sizes, calculated from scale measurement	30
—VIII. The Annual Recruitment of the Haddock Stock at Iceland by the successive year broods	35
— IX. Biological Considerations	42
1. Characteristics of the Scales of Icelandic Haddock	42
2. The Position of the Spawning Grounds, and the Age at which the Haddock reach Maturity	46
3. The 0-Group (first year Haddock) at Iceland	47
4. Comparative Growth Rates of Icelandic Haddock and those of some other Regions	48
5. Food of Haddock at Iceland	48
Summary of Results	50
Bibliography	53
Appendix	54

Section I. Previous Work on Icelandic Haddock.

This paper is intended to serve as a more detailed record of the salient features emerging from a systematic study of all the available Icelandic Haddock material relating to the period quoted in the title. In previous communications (12, 13, 14) briefer references have been made by myself to the characteristics of Iceland Haddock as compared with those of other regions. To Saemundsson, however, belongs the credit of first extending the method of scale-age analysis to the Haddock of Iceland. The preliminary results of his observations appeared in a series of communications to the Icelandic Government (7). Subsequently (8) he published his detailed results, based upon material collected by himself at various points round the coast, and upon part of the data obtained from various cruises of the Danish research vessels. This important paper is frequently referred to in the pages which follow. Not only is it a faithful record of the material collected, but also the only collateral work affording independent conclusions for comparison with those which, based on a wider set of data, are given here.

The literature so far cited deals only with the bottom stages of the Haddock — those which are more readily taken by the usual fishing instruments. For the first three months or so of its life, however, the Haddock leads a pelagic existence during which it may be drifted far from the spawning grounds. The sequence of events during this early stage has, as far as Iceland is concerned, been worked out by Dr. Johs. Schmidt (9), whose classical researches from 1903 onwards have acted as a stimulus to further biological studies in Icelandic waters, where such a range of hydrographical conditions occurs that biological features are epitomised which would only be encountered elsewhere if a very great area were investigated.

For this reason alone it is satisfactory that the International Council for the Exploration of the Sea has recently formed a North-Western Area Committee. There is now more prospect of research in that area, which includes Iceland, being regularised. Since 1924 more adequate material has become available for study. To Prof. Schmidt and Dr. A. Bowman, organising the Danish and Scottish research vessel cruises respectively, belongs the credit for fostering Haddock research by ensuring the directional collection of this material.

Section II. Scope of the Material now available.

Prior to 1924 cruises were made to Iceland by the Danish research vessels in 1903, 1904, 1905, 1908 and 1909.

During each of these cruises all the Haddock caught were measured and sexed.

The instruments of capture were the small 50′ Otter Trawl and, occasionally, in bays and fjords, the eel hand seine net, which took very young bottom stages of Haddock where such were present.

In 1908 and 1909 actual scale samples were taken from one particular locality — Faxebay — the catches of a commercial trawler, using the larger commercial Otter

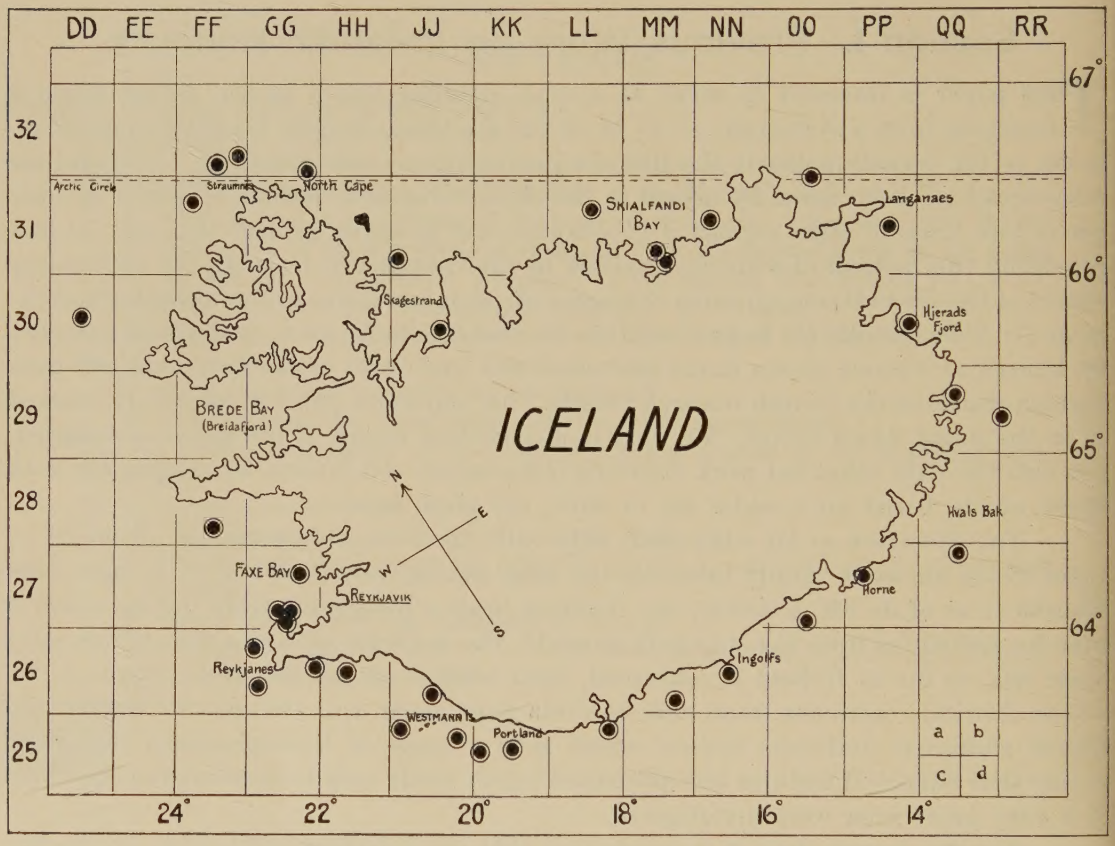


Fig. 1. F. C. Explorer. Trawling Stations round Iceland June—July 1925.

Trawl, being utilised. The records for these two years are therefore of increased importance. For the years 1903—1905 only the lengths and numbers of the Haddock caught are available. These were utilised as far as possible by means of the methods described in the next section. The details of these catches were given in a Preliminary Report (14).

From 1922 onwards, under the direction of Dr. A. Bowman, occasional sampling of commercial trawler catches of Haddock from Iceland was effected in the Fish Market at Aberdeen. The procedure was to obtain full particulars of the number of boxes of Haddock taken during a trawling voyage. The number of hours actually spent fishing was also ascertained. The Haddock in one or two boxes in each category ("Extra Large" to "Small") were actually measured, and the frequency-size distribution of the whole

catch obtained by multiplying up the figures they gave by the number of relevant boxes. This frequency distribution was then modified by the use of a factor bringing the whole down to a standard based upon only 10 hours' fishing. Scales were taken from the measured fish and the ages determined. Thus it was possible to sub-divide the standard time catch into frequencies per age group. In the course of a year anything up to about ten such trawl catches were so treated, with the direction of particular attention to making the data inclusive of changing season and locus of the trawling fleet.

From 1924—1926 the Danish research vessel "Dana" has scale-sampled all catches of Haddock made during its Iceland cruises. In addition the "Explorer", the experimental vessel of the Fishery Board for Scotland, carried out an intensive cruise in June 1925 with the object of surveying the Haddock population all round the island. The points at which trawling observations were made appear on the accompanying Chart (Fig. 1). It will be seen that the work was distributed evenly all round the island. The figure also shows the statistical areas or rectangles into which the area is conveniently divided by the major lines of latitude and longitude. Any rectangle referred to in the text can be found on the map by its reference index — thus MM 31 refers to the rectangle including Skialfandi Bay. The rectangles are further sub-divided into four sections, a. b. c. d. respectively, as shown for QQ 25.

Upon the data collected during this specialised cruise the more theoretical results of this paper are chiefly based. They are of especial value since the collections to which they refer were synchronised in addition to being representative of the entire area. The hydrographic conditions were also determined at each point, and in five cases the stomachs of the fish, with contents, were preserved for study in the laboratory.

For the period prior to 1924, then, the results are of more limited importance, although it is essential to place them on record. The recent period of three years marks the inauguration of what it is hoped will be a continuous and sufficiently prolonged period of sampling, directed towards the numerical evaluation of the various year broods of Haddock, along with the movements of the latter and the degree of survival under present conditions. It is an almost unavoidable fault that a thorough seasonal investigation should be precluded by the restriction of the collection of these fuller data to the summer months.

Section III. The Efficiency of the Otter Trawl in the Sampling of Haddock Shoals.

The results which are to follow are based upon the sizes and the numbers of Haddock captured during a standard time of trawling by the 60′ Otter Trawl. Thus it is assumed that the commercial trawl is of value in obtaining hauls of Haddock which both qualitatively and quantitatively bear a definite and consistent relationship to the entire shoals they are obtained from. It may be taken that the rate of towing the trawl is approximately a constant, so that the area swept in unit time does not vary to any extent. But most fishing instruments act selectively and the trawl, with its vertical

range of only 4—6 feet from the sea floor, is no exception, even in dealing with the Haddock, which is essentially a feeder on the sea bottom. If the selection the trawl makes of the shoal is not an exact replica in miniature of the shoal, it is at least so very typical and consistent that it provides, if repeated time after time, figures which are well nigh duplicates of each other. That is if it is a distorted idea of the shoal which is provided, it is always distorted in the same way and to the same degree, so that the history of a year brood can be outlined from a sufficient number of serial hauls made through the years. Thus it has been possible to study the history of the great 1923 brood in the North Sea, the trawl catches — great in number — repeating over and over again the same meaningful figures. Given a naturally homogeneous area under a given set of conditions, homogeneity of trawl results almost inevitably follows. Indeed the trawl must, for certain species, of which Plaice and Haddock are two, be regarded as one of the most reliable and quantitative sampling instruments in use.

For Haddock, which has its headquarters in fairly deep water, this is especially the case if the waters sampled are of at least a moderate depth. Table A is given to illustrate this. In it are detailed the results of ten consecutive one hour trawl hauls made at the Doghole, near Aberdeen.

The same range of fish is captured in each case with great regularity. In February of another year, with the age groups present in different proportions, quite a different size distribution would be denoted.

In fairly shallow water, where conditions (of temperature among other things) are liable to more sudden fluctuations it is a more common occurrence to find the Haddock population less constant. Even an onshore breeze may cause a temporary withdrawal to deeper water. Less dependence can therefore be placed upon samples taken in shoal water (less than approximately 30 metres in depth). The same consistency as was evidenced in Table A is, however, again to be discerned in Table B, in which are given the results of a random selection of eight consecutive hauls, made by the "Dana" in Faxebay, Iceland. The instrument of capture was in this case the smaller 50′ Otter Trawl. As was the case with the hauls made by the "Explorer" at the Doghole, fishing was engaged in, in the course of making the hauls, at quite different times of day. Much shallower water was, however, trawled in.

From these examples, it is obvious that, despite minor irregularities, there is a very great probability of any one haul giving figures of the proper Order. Thus, in the case of the 1922 and 1923 broods in the North Sea, the former was found to be present throughout life in very small numbers, the latter in very large. The correct numerical ratio of these broods was about 1 : 25, and hundreds of trawl hauls, in the course of years, gave a close approximation to this ratio.

Schmidt (10) has also noted the marked uniformity of the yield of Plaice and Haddock by separate hauls at the same place. He arrives at the personal opinion that the average figures per trawling hour are of real significance.

The qualitative aspect is really bound up in the quantitative. If an age group is present on the grounds in fair numbers it is sampled throughout its size range, and the mean size of that group as obtained from one haul will not vary by more than a few

able A. Catch of Haddock per Hour's Fishing in 10 consecutive hauls; oghole, 9 miles East of Aberdeen. 17th to 24th February, 1926. Depth 05 metres. Gear used 60′ Commercial Otter Trawl, with small mesh covering to Cod End.

Length	Date									
	17/2 26	17/2 26	18/2 26	18/2 26	18/2 26	22/2 26	22/2 26	24/2 26	24/2 26	24/2 26
cms.....	..	..	1	1	..	..	..	..	2	..
—	2	..	4	..	1	1	2	1	3	..
—	5	2	7	7	2	6	7	3	5	..
—	8	3	13	11	6	26	8	8	9	3
—	18	10	14	20	7	22	11	6	7	2
—	10	10	10	17	14	24	14	7	8	2
—	27	19	31	33	24	49	23	32	22	15
—	67	48	50	73	50	81	44	53	51	38
—	76	36	63	78	44	78	51	53	37	43
—	50	35	30	40	20	45	33	30	23	38
—	28	17	15	25	20	31	21	27	19	27
—	33	24	23	25	21	36	12	25	15	20
—	32	27	21	22	18	23	16	20	13	14
—	35	32	17	21	14	25	8	19	11	15
—	21	14	13	17	9	11	8	12	11	7
—	13	8	10	11	5	11	6	10	8	10
—	10	12	7	7	7	6	6	7	6	6
—	8	9	3	6	5	6	3	3	4	5
—	4	5	5	5	2	2	3	1	5	4
—	3	5	4	3	2	2	1	2	1	2
—	2	5	2	2	1	2	2	4	2	3
—	2	2	..	1	1	2	1	1	2	1
—	2	4	2	1	1	1	..	2	2	..
—	1	3	1	..	..	1	..	2	..	1
—	..	1	1	1	..	2	..	..	1	1
—	2	..	..	..	2	..	1	1	2	..
—	..	..	..	1	..	2	..	..	..	..
—	..	..	..	..	..	1	..	2	1	..
—	2	..	..	..	..	1	..	1	1	..
—	1	1	1	..	..	..	1	..	..	..
—	..	..	..	1	..	..	..	..	..	..
—	..	..	1	..	.	1	..	..	..	..
—	..	..	..	..	..	..	..	..	..	..
—	..	..	..	..	1	..	..	..	..	..
—	..	..	..	..	..	..	..	..	..	..
—	..	..	..	..	..	..	1	..	..	..
Totals...	462	332	349	429	277	498	283	332	271	257

Average Catch = 349.

Greatest Deviation = 149 above and 92 below the average = 43 per cent. and 27 per cent re-ctively.

Table B. Catch of Haddock per Hour's Fishing in 8 consecutive hauls; Faxebay, Iceland. 2nd to 6th August 1925. Gear used — Small 50′ Otter Trawl with small mesh covering to Cod End. Depth 34—37 metres.

Length	Date								Totals
	2/8 25	2/8 25	2/8 25	6/8 25	6/8 25	6/8 25	6/8 25	6/8 25	
15 cms.	..	..	..	..	..	1	..	..	1
16 —	1	1	1	..	..	1	..	..	4
17 —	1	1	1	1	2	1	..	..	7
18 —	7	9	6	..	2	5	4	5	38
19 —	31	23	17	7	11	10	24	17	140
20 —	58	26	38	2	15	23	39	21	222
21 —	69	31	36	5	22	39	98	29	329
22 —	21	19	20	9	15	23	49	15	171
23 —	16	9	11	7	14	5	11	14	87
24 —	6	4	5	1	3	2	4	3	28
25	2	1	1	1	2	..	3	..	10
26 —	..	..	..	..	..	..	2	1	3
27 —	2	..	..	1	2	..	..	..	5
28 —	..	1	1	1	..	..	..	1	4
29 —	4	3	1	..	4	..	..	3	15
30 —	5	5	2	1	4	..	3	2	22
31 —	18	15	16	4	11	3	13	8	88
32 —	26	22	40	13	43	20	10	9	183
33 —	49	13	28	20	51	13	10	15	199
34 —	24	23	28	20	52	6	12	17	182
35 —	23	13	31	13	35	5	9	5	134
36 —	13	4	10	8	13	1	6	4	59
37 —	4	2	2	3	3	2	..	1	17
38 —	..	1	2	..	4	..	3	3	13
39 —	..	..	..	..	..	..	1	..	1
40 —	1	..	1	..	..	..	..	1	3
41 —	..	..	..	..	1	..	1	..	2
42 —	..	..	2	..	1	..	..	..	3
43 —	..	..	2	1	..	..	..	..	3
44 —	3	2	1	..	1	..	..	..	7
45 —	3	3	3	2	4	1	..	..	16
46 —	5	1	4	1	2	..	1	..	14
47 —	4	1	3	2	..	1	1	..	12
48 —	6	1	1	..	1	1	1	..	11
49 —	2	..	1	..	..	..	1	..	4
50 —	..	2	2	..	..	..	..	..	4
51 —	..	..	1	..	..	..	..	..	1
52 —	..	Plus one	..	..	..	..	..	..	..
53 —	..	at 58cms	..	..	..	..	..	..	..
54 —	..	..	1	..	..	..	..	..	1
55 —	..	..	1	..	..	..	..	..	1
Total...	404	237	320	123	318	163	306	174	2 045

cimal points from that of another haul. In the case of older and larger fish and the ung stages of scarce broods a greater number of hauls becomes necessary for the estim- ion of an approximately accurate mean size. (These hauls need not, however, be taken one place; in a large area which is naturally homogeneous hauls made in different rtions may be combined for this purpose). The proviso of multiple hauls also applies shallow water regions, where the density of the Haddock population is normally slight.

Section IV. The Methods employed in the Treatment of the Material, and some Results.

Resolution of the Statistics of Haddock Catches into component Age Groups.

It is required to resolve the length-frequency statistics, obtained from a standard ie of 10 hours' trawling, into a series of subordinate length frequency distributions, h representative of an age class. From the latter the characteristic growth rates of e age classes going to constitute the shoals, along with the relative abundance of these e classes, is calculable.

It is very unusual to have, in a given locality, all or most of the possible age classes ed up to 13—14 years) represented in sufficient numbers to give a reliable index the growth rate. There are, however, more often two or more classes sufficiently well resented to be taken as typical of Haddock of their respective ages in that locality. e ages of these may often be obvious from the modal sizes standing out in the frequency tribution. Thus, reverting to the totals' column of Table B, one notes that there are o very distinct distribution series — from 15 cms. to 26 cms., and from 27 cms. to cms. Each of these series suggests a separate age group — in this case Haddock of and 27 months of age, or second and third year fish, respectively. It would be super- ous to take scales from these fish for the sole purpose of age assessment. The modal e of the second summer fish lies between 20 and 21 cms., and that of those of the rd summer between 33 and 34 cms. The actual mean size usually varies slightly from modal size, and is determined by using the method of moments in the ordinary tistical way. In the table, at a fish size of 40 cms., dubiety occurs as to how to age fish, and reference to scale readings becomes necessary. This brings out a third age up of fish — those in their 4th summer, with sizes ranging from 40 to 51 cms. The remaining fish of greater length (54—58 cms.) are, by their scale age, 5th summer ddock. It is obvious that a good few hauls would be necessary to provide sufficient hese to give such reliable frequency tables as occur in the case of the younger groups. e larger commercial trawl does, however, take these larger fish in representative mbers.

The results obtained for each year group are recorded in the following manner:—

1300 (15—26) 20.5

These figures stand respectively for the average number per haul of fish of the summer, multiplied by 10 to obtain the figure per 10 hours; for the range of size,

in centimetres; and for the mean size. Season by season and year by year these entries are repeated from additional material, as full as the collecting resources will allow. For other naturally distinct parts of the area a similar series of records is made. Where more than one entry occurs from one locality for a particular month the resultant figures of all entries are utilised, being found by finding the final mean of the means — weighting the latter of course by the number of fish (per 10 hours) to which they refer. By plotting out these final means for each locality, age against length, it is found that certain localities give similar curves of growth, quite different from those of others. It then becomes possible to divide the whole area being studied into a few sub-areas, each with a characteristic growth rate. Further, by combining the means for these sub-areas — always with due allowance for the frequency of individuals to which they refer — the resultant growth rate for the whole area is obtained.

Sufficient scales must be taken even from the younger and more obvious age groups to determine their lower and upper limits. In practice all Haddock of over 3 years of age are scaled, since the lower sizes of one age group may at this stage easily coincide with the higher of the group one year younger.

It is impossible, owing to the poor numbers of certain age classes during a given period of years, to obtain sufficient Haddock of these classes to give determinative results. The above procedure must therefore be supplemented if interpolation is to be avoided. For this reason, and for the purpose of checking these ready results, it is desirable, if time permits, to make a fuller use of the scales collected.

2. Calculation of Growth Rates of Haddock from the Annual Zones in the Scales.

Some recapitulation and amplification of what has been said before (12, 13) is necessary at this point, especially in view of the new data available from the larger fish of Iceland.

For about the first eight years of life Haddock scales, in the overwhelming majority of cases, accurately portray age. (In the case of young Icelandic Haddock one may with 100 per cent. accuracy determine age from scale). Proofs of the fact that the passage of a year is definitely delineated in the scale architecture have been obtained from:—

a. Haddock marked at sea, or kept in the aquarium.

b. The appearance of each of recent year broods in the North Sea in characteristic numbers. The ratio of these numbers, as found in one year, persists in another and another, scale ages (apart from other evidences of age) being the criterion of frequency assessment.

c. The size frequency distribution of a numerous young brood — as shown in Table B — is indicative of a definite age, of which scale examination is absolutely confirmatory.

d. With very rare exceptions the annual zone on the scale is completed about the end of winter, and in the following spring a burst of new growth is shown on the scale.

The lengths of the annual zones on the scales would, if fish and scale grew strictly

proportion to each other, represent in miniature the growth of the fish in the years ey correspond to. Then by means of the well-known formula —

$$\frac{v_1}{V} \times L = l_1$$

here V is the total length of the scale from origin to proximal edge, L the total length the fish, v_1, v_2 ..... v_n the lengths of the scale from origin to the close of years 2 ..... n respectively, and l_1, l_2 etc. the corresponding lengths attained by the fish the ends of these respective years.)

— it would be possible to calculate the growth rate of each fish from one of scales.

All workers who have made use of this hypothesis have encountered a difficulty ich calls for discussion. Suppose, for example, that Haddock at Iceland actually reach .5 cms. in length in the first year of life, and 30.5 cms. in the second. Now if a fair mple of second year fish is taken, and the size they reached at the end of the first year lculated from scale measurement, it is found to fall some $^1/_2$—1 cm. short of 16.5 cms. nilarly this l_1 value, as calculated from third, fourth and older Haddock scales falls ogressively further short, and from the oldest and largest Haddock may work out only 13 cms. Thus it is always made to appear that the young fish present on the ounds are better growers than were the older fish at the same time of life. This is of urse highly improbable and some explanation of the phenomenon must exist.

It has been shown (12, 13) that, once a year zone is laid down as scale substance, ere is no compression when another year zone is added round it. Again, it is a propo- ion incapable of proof, although with probably some truth in it, that the better grown unger fish tend to shoal with the laggards in growth among the fish one or two years der. An objection to this theory is that we never seem to encounter the remaining shoal more poorly grown younger fish, which ought to give us a lower mean size, equal to even less than that calculated (for that particular age) from the scales of fish slightly er. The deficiency in calculated, as compared with observed, sizes is too constant a enomenon to be explained away in facile fashion.

The following appear to be more adequate explanations, since they are capable some degree of proof:—

a. Bowman (1) has found that there is a law regulating the size of Haddock ich escape through the meshes of the cod-end of the trawl. There is a size beyond which fish can escape, and there is a size below which all fish may escape. Between these o extremes there are appropriate gradations.

rcentage of Escape at each size, from Cod-end with 3—$3^1/_4$ inch mesh.

h Size in cms.	14	15	16	17	18	19	20	21	22	23	24	25	26	27
centage of Escapes ...	99.5	95.2	91.4	88.3	78.1	69.7	54.6	36.4	18.3	5.9	2.3	1.3	1.0	0.0

Thus the trawl begins to take toll of an upgrowing Haddock shoal when the fastest wing fish attain a size of 14 centimetres (i.e. at the end of the first six months of life);

when an average size of about 20 cms. has been reached, as many Haddock escape as are retained; and after 26 centimetres' length is reached no fish escape. At Iceland this size is attained, on the average, at about $1^3/_4$ years of age. That is to say, for more than a year the slower growing members of the shoal have the better chance of escape, with the result that the trawl is continually sifting out a disproportionately large number of the better growers. In an area which is rather intensively fished over the effect must be considerable. The mean size of l_1, calculated subsequently from the survivors of the shoal, naturally tends to fall below the average size attained by the entire shoal at the end of its first year.

b. Prominence was given (12) to a proof that there is considerable variation in the virtues of scales, taken from different portions of the body of the Haddock, as media for the calculation of growth rate. Scales are first laid down in the mid and post-lateral region of the body. This occurs when a size of from 3 to 4 centimetres is attained. In other parts of the body the integmentary units are later in being formed. Thus in the case of the forward end of the body, in the region of the pectoral fin (from the shelter of which it is sometimes necessary to take the scales when other parts of the body are denuded by rough matter in the trawl), there is no sign of scale formation until the fish is on the average $1^1/_2$ cms. larger.

Now even the first formed scales (those on the flank under the 3rd dorsal fin) give a calculated l_1 too small, on the average, by $^1/_2$ cm. The deficiency increases to about $3^1/_2$ cms. if pectoral scales are used for calculation. In other words the size of the scale on formation does not bear the same proportion to the size of the fish at that time as scale size does later in life. Some idea of the relationship between the growth of the scale in two portions of the body is obtained by quoting from Table A (12).

Sixteen scales from the 2nd dorsal and pectoral regions respectively of a 55 cms. North Sea Haddock gave the following calculated growth rate for the fish:—

Year	1st	2nd	3rd	4th	5th	6th	
2nd Dorsal	17.5	8.8	6.7	5.4	5.1	5.2	centimetres
Pectoral.....	16.3	8.1	6.3	6.1	5.8	6.4	—

For comparison, the figures for a 64 centimetres Iceland Haddock may be quoted from Table F (*loc. cit.*). Fifteen scales were in this case taken from each part.

Year	1st	2nd	3rd	4th	5th	6th	
2nd Dorsal	15.9	8.3	8.9	8.7	10.6	6.6	centimetres
Pectoral.....	12.3	8.6	8.7	8.1	11.8	8.8	—

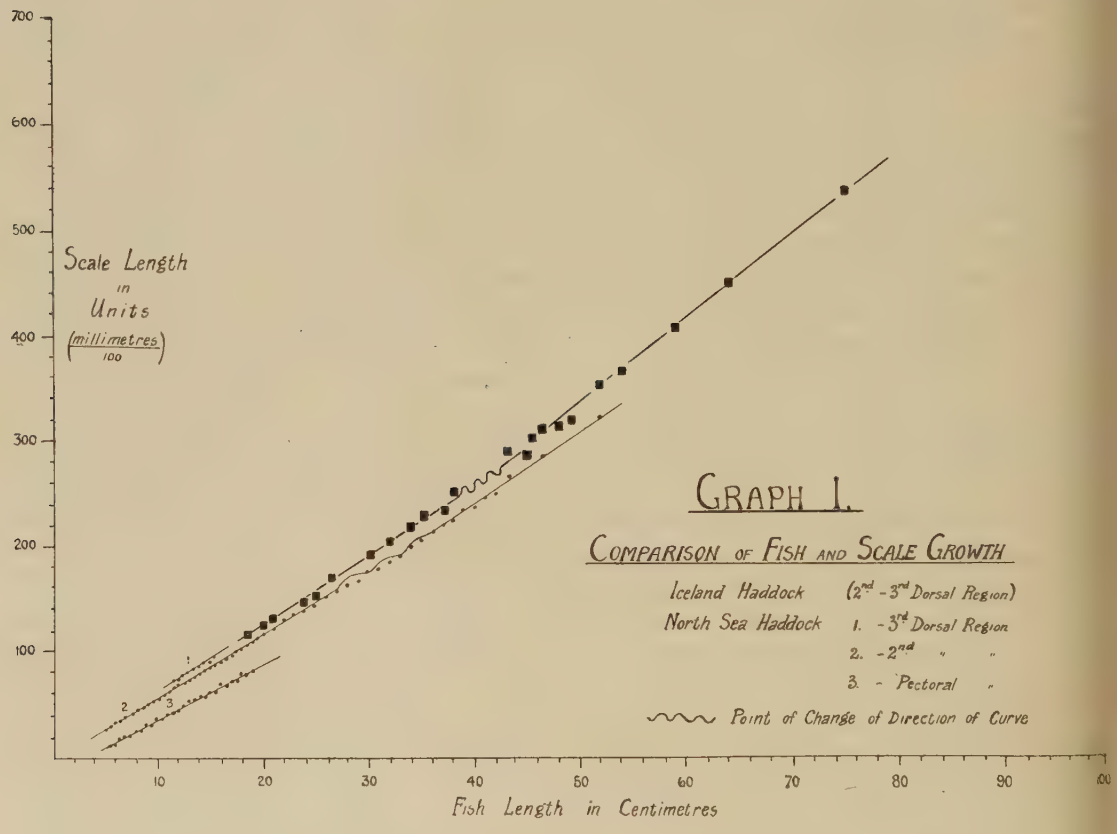
It will be noted that the initial handicap borne by the pectoral scales is not materially increased in later years. Its effect is felt only in the first year. In the later years the increment in fish length as calculated from the pectoral scales definitely exceeds that calculated from the dorsal flank scales. Similarly the use of any but the first formed scales on the body gives rise to distorted calculated growth rates. The net result is to provide an underestimation of the growth in early years and an exaggeration of that in the later years of life. This is easily understood when it is reflected that if the calcu-

ed size for the first years is on the low side, and the same ultimate fish size (say 55 cms.) to be attained, then the balance must be restored by the showing of magnified growth e for the later years. The total error, in the case of the first year calculated size, varies n 0.5 to 3.5 cms. according to the part of the body from which the scales are taken. the observed deficiency in the case of the calculated size at the end of the second r can, however, rise as high as $8^1/_2$ centimetres it is still necessary to look for some er source of error.

c. The material collected from Iceland has for the first time provided a sufficiency lata relative to large Haddock. From a study of the latter there emerges a third and ent cause of the observed disparity between calculated and actual growth rates. herto (12, 13) only a relatively few larger Haddock were studied, or indeed available study. On the "Explorer" cruise therefore a special point was made of collecting a pletely representative set of scale samples. Time did not permit of the actual selection he rather restricted number of the largest scales on the fish body, but the samples e taken with the point of a pen knife from near, if not actually in, the optimum body on. The average scale examined from these samples would approximate to those id in the 2nd dorsal region, giving, therefore, an initial error in calculated l_1 size of ut 1 centimetre. In all 5809 scales were examined. The age of each of these was first ll determined and the envelopes containing the scales were then arranged in bundles n reference to locality and age class. Mr. W. Main, Technical Assistant, carried through rather lengthy process of measuring the zones in the scales. The Leitz camera lucida a combination of objective and eyepiece giving a magnification of 100 diameters e used. Care was taken to maintain the angle of the mirror at 45° to the normal and ave the scales lying vertically in the field, as only thus can a distorted image be ided. The measurements of the zones were obtained by picking off the zonal bound- s in the image projected upon a graduated 500 millimetre scale (placed in coincidence gside the microscope). The measurements of the Haddock scales so obtained were s in millimetre units. From them the calculated sizes they represented were read from suitably prepared graph paper, graduated for fish length along the abscissa for scale size along the ordinate, this being a rapid method of applying the formula ady given above. The mean results of all the measurements, including those previously ained from North Sea Haddock, appear in Table C below and are expressed in Graph 1. size distribution of Iceland Haddock being extensive, with unequal representation ge groups, there was no possibility of securing the same number of samples at each timetre size. Some grouping of the results was necessary in order to smooth, to a ain extent, any irregularities arising from insufficient sampling. Even so the individual ns were the outcome of as wide a range as from 13 to 1414 scales.

A glance at Graph 1 reveals the fact that the Iceland scales, length for length Haddock, are slightly larger than those of the North Sea. This, however, may not a specific difference as the former were more carefully selected with regard to region he body. Thus line 1, representing the optimum scales from the 3rd dorsal region mall North Sea Haddock, would if produced lie just above the Iceland line. Line 3, n measurements of North Sea pectoral scales, lies very much below either.

The second feature of these graphical lines is that for a considerable period from a fish size of approximately 5 cms. — the lowest practicable size for scale selection — a straight course is followed. There comes a point, represented in both North Sea and Icelandic graphs by an undulating line, where the direction is changed. Thereafter the inclination is steeper, but the points plotted may still be said to lie on or near a straight



line. What seems undoubtedly to happen is that the scale, after a time, grows more quickly than it did with reference to the concurrent growth of the fish. A closer examination shows that the point of change occurs, in the case of North Sea Haddock, between Haddock sizes of approximately 27 and 33 cms. and in the case of Icelandic Haddock between the sizes of approximately 39 and 44 centimetres. Thus the data before us lead to the conclusion that fish and scale grow for a considerable period of life (nearly three years) at a definite relative speed, and thereafter the relation alters, while remaining quite definite.

In using scale measurements for fish size calculations, then, account must be taken first of all of the factor introduced by the region of the body from which the scale is selected. This gives rise to a deficiency error of from $^1/_2$ to $3^1/_2$ cms. Thus the graphs

Table C. Mean Scale Size compared with size of fish.

Part I. From all Haddock scales measured in 1920—1923. Size of fish in centimetres. Scales in units.

Fish Length	Scale Size Range	Mean	No. of Scales	Fish Length	Scale Size Range	Mean	No. of Scales	Fish Length	Scale Size Range	Mean	No. of Scales
5.0	24—28	26.5	6	14.5	57—103	80.7	355	28.0	100—220	162.0	188
5.5	24—35	29.3	29	15.0	63—103	83.8	306	29.0	105—240	167.0	224
6.0	25—38	31.6	34	15.5	63—114	86.7	279	30.0	105—220	175.0	254
6.5	30—40	35.2	25	16.0	68—118	89.8	264	31.0	125—240	178.0	345
7.0	32—44	37.5	27	16.5	70—118	92.1	208	32.0	115—250	185.0	337
7.5	32—50	40.8	25	17.0	74—119	96.1	207	33.0	135—270	191.0	352
8.0	34—51	44.1	38	17.5	74—126	99.8	205	34.0	150—295	198.0	327
8.5	40—56	47.5	50	18.0	76—131	103.4	217	35.0	120—310	205.0	401
9.0	42—58	48.9	53	18.5	76—144	105.8	183	36.0	145—320	212.0	339
9.5	43—64	51.4	64	19.0	88—144	108.5	131	37.0	140—320	220.0	385
10.0	45—64	54.1	49	19.5	89—144	112.3	92	38.0	150—325	224.0	300
10.5	47—74	58.2	68	20.0	94—143	116.8	49	39.0	160—335	233.0	332
11.0	47—79	62.4	87	21.0	85—165	122.0	85	40.0	160—330	238.0	191
11.5	47—85	65.0	128	22.0	90—175	129.0	109	41.0	175—330	245.0	152
12.0	51—88	68.7	191	23.0	90—170	136.0	128	42.0	190—325	248.0	100
12.5	53—88	70.9	236	24.0	85—185	139.0	128	43.5	180—355	265.4	204
13.0	56—91	73.6	310	25.0	95—190	143.0	194	46.5	210—375	283.0	104
13.5	56—97	75.8	355	26.0	110—190	151.0	199	52.0	265—445	320.8	42
14.0	57—97	78.6	377	27.0	110—205	157.0	174	58.0	300—450	366.0	20

Part II. From Iceland Haddock, cruise of F. C. "Explorer" 1925.

Fish Length	Mean Scale Size	No. of Scales	Fish Length	Mean Scale Size	No. of Scales	Fish Length	Mean Scale Size	No. of Scales
18.6	115.8	140	34.2	217	1220	47.9	310	71
19.9	122.7	54	35.6	226	1414	49.3	316	164
21.1	128.3	170	37.2	232	1227	51.9	347	40
23.7	144.5	42	38.0	248	52	54.1	363	45
25.1	147.7	27	43.5	284	466	58.7	402	28
26.4	166.5	17	44.7	283	130	64.3	443	31
30.4	189.9	235	45.4	301	237	74.8	535	13
32.3	202.4	311	46.5	306	153	..	..	..

to 3 if produced back to the abscissa cut at points corresponding in fish lengths to approximately $^1/_2$ to $3^1/_2$ cms. If then pectoral scales (line 3) are considered, it will be seen that scale size lags behind fish size by an amount representing $3^1/_2$ cms. growth of the latter. The appropriate correction which should be added to the calculated lengths, obtained from moderately well selected scales ranging in size up to 180 units (North

Sea) and 260 units (Iceland) — the approximate points on the ordinate opposite the undulating portions of the graphs — is about 1 cm, since both the graphs referred to cut the abscissa at a point about 1 cm. to the right of the origin. In actual practice this is actually the correction which has been found to be necessary. Of course this correction is added in full only to the calculated size (l_1) for the first year of life, as it is when the scale is first formed, as the rearward extensions of the graphical lines show, that it fails to represent the size of the fish in the same proportion as, say, zones 2 and 3 on the scale bear to growth in fish length during the second and third years. The additive corrections to be made on this score to l_2, l_3 etc. therefore become less and less to reach zero when L, the actual fish size, is reached; this is so since they are calculated from v_2, v_3, etc. — the sizes of the corresponding scale zone — which are compounded of v, the deficient first year zone, plus one or more zones actually representative of the growth of the fish.

After scale sizes of approximately 180 (North Sea) and 260 (Iceland) units have been reached a new scale of corrections becomes necessary. The deficiencies already mentioned are made still larger by the increased relative growth of the scale which now sets in. If the upper portions of the two graphs be extended back to the abscissa they cut it at points about 5 and $8^1/_2$ cms. from the origin (North Sea and Iceland respectively). It will be best to take a hypothetical example to see how the scale zones now compare in relative size and how the calculated sizes are affected.

Suppose a fish of 60 cms. in length to be exactly six years of age, and to have grown in length by 10 cms. each year. For the first four years up to a fish size of 40 cms. the scale has not grown so quickly as in the last two years. Let the deficiency in each of these years to one-tenth — the scale growing 9 instead of 10 units. From the formula the following rate of growth would be found for the fish:—

Year	1.	Real size	10 cms.	From formula	=	9/60 × 60	=	9 cms.	Deficiency	1 cm.
—	2.	—	— 20 —	—	—	=	18/60 × 60	=	18 —	—	2 -
—	3.	—	— 30 —	—	—	=	27/60 × 60	=	27 —	—	3 -
—	4.	—	— 40 —	—	—	=	36/60 × 60	=	36 —	—	4 -

At this point suppose the scale increases in rate of growth, adding 12 instead of 9 units per year.

Year	5.	Real size	50 cms.	From formula	=	48/60 × 60	=	48 cms.	Deficiency	2 cm.
—	6.	—	— 60 —	—	—	=	60/60 × 60	=	60 —	—	0 -

In the case of Iceland Haddock the critical size, when alteration of rate of relative scale growth appears to occur, is from about 39—44 cms., and occurs therefore in the 4th year. The maximum deficiency in calculated size will therefore tend to occur in the cases of l_2—l_4 (l_2 being included since the other cause of deficiency — that of scale selection discussed above — is still at age 2 quite effective). The deficiency will, for l_2—l_4, be at its maximum when old and large Haddock are the subjects of scale measurement, since several new year zones at the increased rate of growth will have placed the earlier zones

a considerable disadvantage. Scrutiny of the results given later in column G (Table D) ows that such is the case. Indeed the tendency in all the vertical columns E—G is r the deficiencies to increase towards years 2—4 and then to decrease, as is the case our hypothetical example given above.

In the case of North Sea Haddock the change of rate of scale growth appears occur at a fish size of approximately 10 cms. less, when the age would, however, on count of the slower growth rate, be from 2—4 years. There may be some significance the fact that the increase in growth of these scales occurs in both cases round about e time of the first maturation of the gonads. Lea (4) showed that in the later life of the erring the scale-bearing intermediate part of the body increases in relative size to the zes of head and tail, which, however, are relatively larger than the body in young fish, that then the scales on the body portion are proportionally smaller than the fish. the case of the Herring, then, the ratio of scale length to fish length increases with e age of the fish, as it appears to do in the case of Haddock. Heincke (3) showed that addition different portions of the body of the Herring grow at different relative rates different periods of the life cycle.

It is not intended that the conclusions reached here, in the case of the Haddock, ould be more than tentative, but they are sufficiently accurate to serve as a working sis for the practice of scale-measurement. The final establishment of more accurate bles of correction is desirable for all regions with an independent Haddock stock, t must await a separate investigation directed to that particular end.

3. Estimation of the Relative Frequency of the Various Year Broods.

It is one of the aims of Fishery Research to make a census of the age groups of e important food fishes in their various habitats, and to work out their movements t only from season to season but from birth to old age. If in addition the rate at which e brood produced in a year dwindles in numbers, under the existing fishing conditions, worked out the investigator should gradually reach the position where the fishing ospects, for a year or two ahead at least, could be forecasted with increasing accuracy. ne statistical and biological data under consideration in this paper are inadequate for ore than a very partial realisation of such a desideratum. They are treated below, never- eless, in the manner which is proving useful for North Sea studies, which have the lvantage of being based on more consecutive and representative data. The con- usions reached are therefore to be regarded as somewhat restricted in scope and finality, well as subject to modification when the perspective afforded by more ample future cords is obtained.

The method of arriving at the mean rate of growth of Icelandic Haddock has eady been described. In much the same fashion the average density of numbers of ese fish (as available for capture by the trawl) may be worked out. Ideally, each of the tistical rectangles into which the area is partitioned (Fig. 1) ought to be sampled several nes during at least the height of the two seasons — spawning and feeding — when addock are to be found in greatest numbers. The shoal density per rectangle per unit

time of feeding could then be estimated for each season, and the seasonal local densities combined into annual regional densities, care being taken to weight each mean density used in the calculations by the number of rectangles to which it referred.

In practice this ideal is well-nigh unattainable and all that can be done is to approximate to it. At the present stage of the investigations we cannot afford to be too critical of the finer differences in the sources of our samples. The commercial vessel will usually fish at points where the shoal density is, at the time being, denser than elsewhere in the vicinity, and has the additional fault, from our point of view, of failing to catch the youngest class of fish. The research vessel on the other hand returns fuller information of the small fish, although its efforts may not coincide in time and place with the occurrence of the densest shoals. Nevertheless, on the average, it is almost certain that the order of the results is reliable in both cases, variation due to natural causes being what it is. A fuller knowledge will enable an allowance to be made for season and locality, as for method of sampling, as can be done in the case of the North Sea. The number of Icelandic records, if split up into categories allowing for all the factors whose influence is not established, would be so insignificant as to render any kind of a connected study impossible.

The mean densities of the year broods are tabulated later (Table E). Each refers to the average catch per 10 hours' fishing with the commercial otter trawl, unless otherwise mentioned. Figures obtained from research vessels are of particular importance since they take account of the very young broods, and are darkened to differentiate them from those obtained from commercial vessels. The number of samples from which each average was struck is given. Seasonal variation is not specially considered beyond the fact that the sub-division of the entire area into natural sub-areas does to some extent make the study a seasonal one. Thus the east and north coast results are given separately from those for the south-west. The latter form the normal habitat of the mature Iceland Haddock, and are fished by commercial vessels all the year round; the east and north coasts are visited only in summer and autumn, to which seasons the entries refer.

Section V. A Brief Survey of the Hydrographic Conditions in Iceland.

A considerable range of hydrographical conditions exists in the Icelandic fishing grounds, so that biological studies are invested with great interest. The grounds are restricted to the comparatively narrow shelf around the island; outside this the water is of much greater depth than shoals of Haddock live in. Schmidt (9) has shown that in spring there is less difference between the temperature of the water at South Iceland and South Ireland (6.1° and 8.5°) than there is between south Iceland and north and east Iceland (6.1° and 1.5°). The position in April is that the south and west coasts, from the Horne right round to Brede Bay in the north-west, have a water temperature of from 5—7°, while on the east and north-east only 1—2° is attained. The north-west coast

his time holds an intermediate position, with water of a temperature of 2—3°. Later in May—June, the temperature has risen to 7—9° in the south and 1—4° in the north July the corresponding temperatures are 8—11° and 4—9°; by August 7—11° 6—9°

In Fig 2 are given the isotherms for April and for June, the latter being drawn n the data relating to bottom temperatures taken during the cruise of the "Explorer",

ig. 2. Bottom Temperatures. Iceland, June 1925. The broken lines show April Temperatures, after Schmidt (9).

e 1925. The marked advance of the warmer conditions from the south and west ards the north and east is notable. Thus the 6° isotherm has advanced northwards n south-west to north-west, a distance of about 2° of latitude. Similarly the limit of very cold water of 1° temperature has been pushed back from north-east to east. the south-east, where the cold polar current from the north meets the warmer At- ic current from the south, there is a very steep thermocline which must act as an ctive barrier to any degree of interchange of Haddock stock between south and east. e conditions on the south coast remain the most constant, the temperature rising tually with the advent of summer. Data are lacking for the compilation of autumn herms, but we know that the north and eastward movements of warmer water proceed

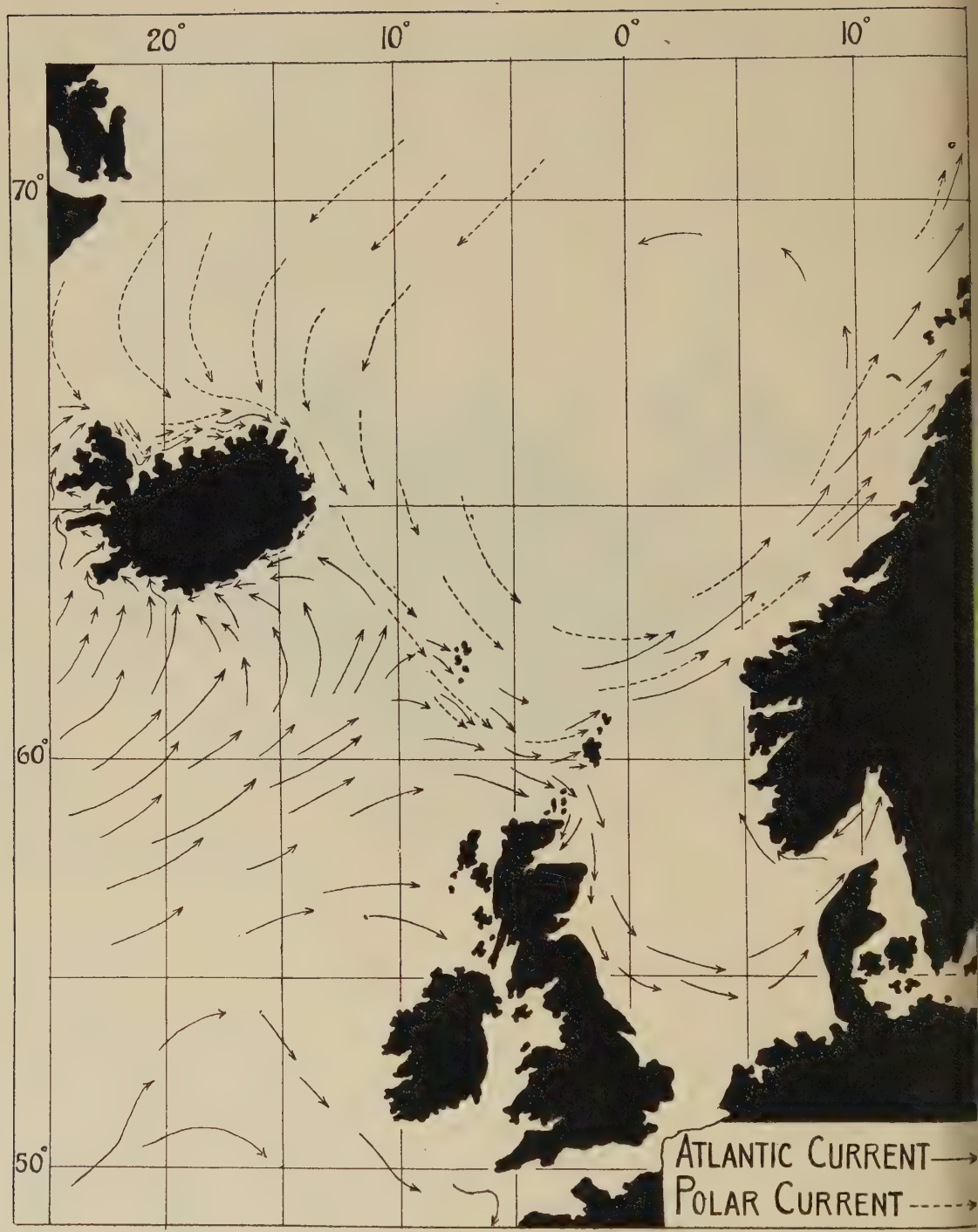


Fig. 3. Mainly after C. Ryder (Special Print of Nautical-Meteorological Annual, Dan. Meteorolog. Inst. 1901).

still further, and the Haddock shoals are enabled to push in along these coasts. This migration is almost totally in a clockwise direction as the thermocline on the east side must tend to inhibit a direct interchange between south and east.

These conditions are governed by the prevailing currents to which the Icelandic coast is subject. Fig. 3 shows the main incidence of these currents. The south and south-west coasts are exposed to the main onset of the warm Atlantic drift, which thereafter has a westerly trend until it contends, on the north coast, with the Polar current coming in from the north. The latter prevails in winter on the north coast, but in summer the former extends its influence as far as the north-east. The waters off the east coast are the coldest, owing to the southward flow of the Polar current.

The most sustained warmer conditions therefore occur on the south coast, where the winter temperature is only 2—3° lower than that of summer. The west coast also experiences these better conditions for the major portion of the year and is thus not naturally separable from the south coast. The north coast has only a limited spell of moderately warm conditions in summer and autumn, while the east coast has almost persistent winter conditions. North and east coasts are therefore to be expected to exhibit different biological features from each other and from the south-west.

Section VI. Sub-division of the whole Icelandic Plateau into Natural Sub-areas.

It is assumed that the Icelandic Haddock are a self-contained stock, cut off all round from interchange with those of other grounds by water of a depth greater than the known normal limit of Haddock distribution (280—290 metres). All the biological evidence, as will be shown, is confirmatory of this assumption.

The nature of the hydrographic conditions suggests a partitioning of the Icelandic fishing grounds into three portions:—

1. South and West Coasts.
2. North Coast.
3. East Coast.

Saemundsson (8) found little or no difference between the characteristics of the Haddock on the south and west coasts, and the results which are to follow here tend to confirm his conclusion. He classified his Cod and Haddock data into five sub-areas:—

1. South:— from Eystra Horne to Reykjanes.
2. South-West:— from Reykjanes to Breidafjord.
3. North-West:— from Breidafjord to Straumnes.
4. North:— from Straumnes to Langanaes.
5. East:— from Langanaes to Eystra Horne.

Schmidt (10) recommends that continuous investigations for some years should be concentrated at suitable points on the south, west, north and east coasts. He gives the following as suitable testing stations on these respective coasts:—

Ingolfshófdi; Skagi (Faxebay); Skialfandi Bay; Hjeradsfloi.

In the case of the Haddock the choice of these testing grounds would certainly provide four sets of data differing in aspect. Some provision of alternative stations would, however, require to be made if the tests are to be carried out in one year in, say spring, in another in autumn. In other words it would be necessary to know the specific points, for a particular season of the year, at which the denser and more characteristic shoals are to be found on each coast.

It was natural that the data discussed in this paper should first of all be assembled under the four headings — south, west, north and east coasts respectively. Where a record pertained to a point near the border line of any two of these zones, and in the absence at first of a knowledge of the precise position of this border line, it was classified in accordance with the balance of agreement of its characters with either the one or the other zone.

Section VII. The Growth Rates found for Icelandic Haddock.

1. From the Actual Measurement of Specimens.

It will be shown later that there is the possibility of grave errors if only one year brood, or one season's observations, be used as a basis of calculation of the growth rate of Icelandic Haddock.

The mean sizes of all the available records for the various age groups have accordingly been combined in the plotting of Graph 2. The method of arriving at the mean growth rates for the four coasts was that already outlined. For each month the records were combined, the resultant mean sizes attained by the age groups being found, using the precaution of weighting each of the original means going to produce them by the number of fish (per 10 hours' fishing) to which it referred. The age groups most frequently recorded were the younger ones, and most summation was necessary with these. The resultant monthly mean sizes for each coast were plotted and graphs drawn to fit the resulting loci. For Haddock of over six years of age (small dots in the graph) the records were naturally less numerous, as one or other of the older age groups was often absent from catches. The chain line represents the resultant mean growth rate for the island generally; it was obtained by combining the means for the four regions.

The movements of the Haddock from the grounds colonised during adolescence towards the spawning grounds, which extend from the Horne to near the North Cape on the south and west coasts respectively, lead to a general fusion of the four types. Thus after the age of five or six years is attained distinctive regional growth rates can no longer be distinguished, and one curve of growth is approximated to by the fish, independently of where they are caught. Any adult Haddock taken on the north and east coasts are temporary summer feeding immigrants from the west and south.

It is worthy of note that Saemundsson (8) found from his investigations that sizes of 47 and 55 cms. are reached at the ends of years 4 and 5 respectively. These figures

re practically identical with those found here and expressed in the graph. The annual crements in length are:—

Years 1— 6: $16^1/_2$: 14: 9: 8: 7: $5^1/_2$ centimetres respectively.
— 7—10: from $3^1/_2$ to 4 centimetres each year.
— 11—14: — 2 - 3 — — —

The characteristic rates of growth of the four regions will now be considered parately.

Type 1. South Coast.

It is on this coast that the fastest growth of Haddock occurs. In summer, after e close of the spawning season, fish of the rapidly growing type are found moving stwards to the region between Ingolfs and Hvals Bak (Fig. 1). As winter approaches this pe of Haddock moves westwards again and appears between Westman Isles and Reykja- s. These points — Hvals Bak and Reykjanes, mark the eastern and western limits spectively of the most rapid-growing Iceland Haddock. The steep thermocline shown on e hydrographic chart (Fig. 2) to occur near Hvals Bak must serve to check the easterly vement of these fish. At other times from those mentioned there is a residue of more orly grown fish, both towards the eastern and western limits of this coast, so that certain times of the year it might be possible to differentiate a south-easterly and a uth-westerly sub-type as distinct from the true south coast type. The habitat of the ter is, in the season of best growth (summer and autumn), on the south coast, exposed the direct onset of the Atlantic Stream. In the spawning season, however, it has with- awn to the south-west coast. On moving eastwards from the spawning grounds in rly summer it is followed and replaced by a more westerly type. Again on moving back a westerly direction towards the spawning grounds it leaves behind the fish of slowest owth, including those which in summer pushed furthest round to the east side. These ggard fish give rise, at least in some years, to a considerable amount of spawning between e West Horne and Westmann Isles. It may be from this section of spawners that, in ceptional years where sufficiency of fry and suitability of current combine, the east coast well stocked with fish of the first year. In 1904, for example, large numbers of fry ust have reached the east side, as early in 1905 the "Dana" caught unusual quantities 1 year old Haddock there. Alternatively they must have drifted several hundreds of les in a clockwise direction from the south-west or west spawning grounds.

Type 2. West Coast.

As has been hinted this type is only to be distinguished from that of the south ast for the first 5—6 years of life. The maximum difference in mean size between the e, age for age, is 5 cms., in favour of the south type. This fall, along with still greater duction of growth rates as the north and east coasts are approached, follows the down- rd gradient of mean annual temperature in the same direction. From the data it is be noted that by the 4th year some and by the 5th year more of the southern type migrate for a certain distance up the west coast. Similarly some of the western type ve towards the south-west. It thus comes about that by this age it is possible to

separate a better grown south-west from a more poorly grown north-west type. The general tendency is to show intermediate characteristics, north-west with north and west, south-west with south and west. The equilibrium between the two is of a nature depending largely upon the conditions prevailing at the time — chiefly, in fact, to the predominant year broods and their distribution when young (a subject dealt with later). In effect, the south-west sub-type may extend its range as far north as North Cape in the autumn of one year, whereas the north-west sub-type may reach down as far south as Reykjanes in the early summer of another. Thus the 1904 brood, nurtured chiefly in the east and north, ultimately found its way to the south-west to spawn, and there gave for that age group an average size much below the normal. It approached the south-western spawning grounds in waves of increasing intensity of numbers in its 4th and 5th years, and ultimately caused (in Faxebay) a lowering of the mean size normally attained in the west.

The west coast, then, traversed as it is in varying degrees by northern and probably eastern types approaching maturity, as well as being subject to incursions from the south, cannot be definitely demarcated as a region with a typical growth rate. The rate ascribed to it in the graph was obtained by taking the mean of the results obtained over a long period of years. To attempt to establish a north-west type is still more difficult. This region is not colonised to any extent by Haddock up to the age of about 3 years, but draws upon north and west alternately, as the seasons change, for its transient population of older fish. It is not surprising therefore that the curve of growth for the west approximates very closely to that of the resultant for the whole island.

In early spring the line of division between west and north for young Haddock is at FF 31 (near C. North). Later in the year, in the case of older fish, this boundary is pushed in along the northern coast to JJ 31 as the warmer Atlantic water advances in the same direction. Between the fluctuating and derivatory north-west and south-west sub-types the line of division is Brede Bay (FF 29). After reaching the age of 12—13 years the Haddock appears, from its comparative absence in these records, to forsake the south for the west, north-west and, occasionally in summer, the north.

Considerable spawning occurs in the south-west and west. The normal drift of the fry seems to be along the west and sometimes the north coasts. Some drift may also occasionally take place along the south coast, although the latter is itself a region of spawning and probably gives rise to its own brood fish. In years of accentuated anticyclonic drift of fry the west and south coasts appear almost entirely to lose the new broods to the north and east. According to Schmidt (9) the general direction of the currents at Iceland is such as to prevent the drift of pelagic fry out over great depths (to be subsequently lost) but will tend to bear them in a direction parallel to the curves of depths, or from deeper to shallower water. There is thus little danger of the almost total failure of any year brood on this score.

Type 3. North.

It is not usual for first year Haddock to populate the north coast in great numbers. This region normally derives its stock from the west, whence sometimes in their second,

ss often in their third year of life Haddock advance along the northern coast and may tend round to the east side at PP 30. These immigrants remain until the 4th or 5th inter before leaving for the return journey to spawn in the west and south-west. Save r backward adolescents and the occasional older summer immigrants already referred the north and east sides are without Haddock of over 5 years of age. In other words e stock is composed entirely of immature fish.

During the cruise of the "Explorer", 1925, fishing was first begun on the east le and resulted in the capture of only a few Haddock, just over a year old. No older ood was encountered all the way round to Skialfandi Bay on the north coast. Here e advancing head of warmer water was first encountered (temperature about $4^1/_2°$ C.) d with it great shoals of third, fourth and fifth year Haddock. These northerly fish, shown by Graph 3, had a distinctly more moderate type of growth than those caught the same month on the west and south coasts.

Type 4. East.

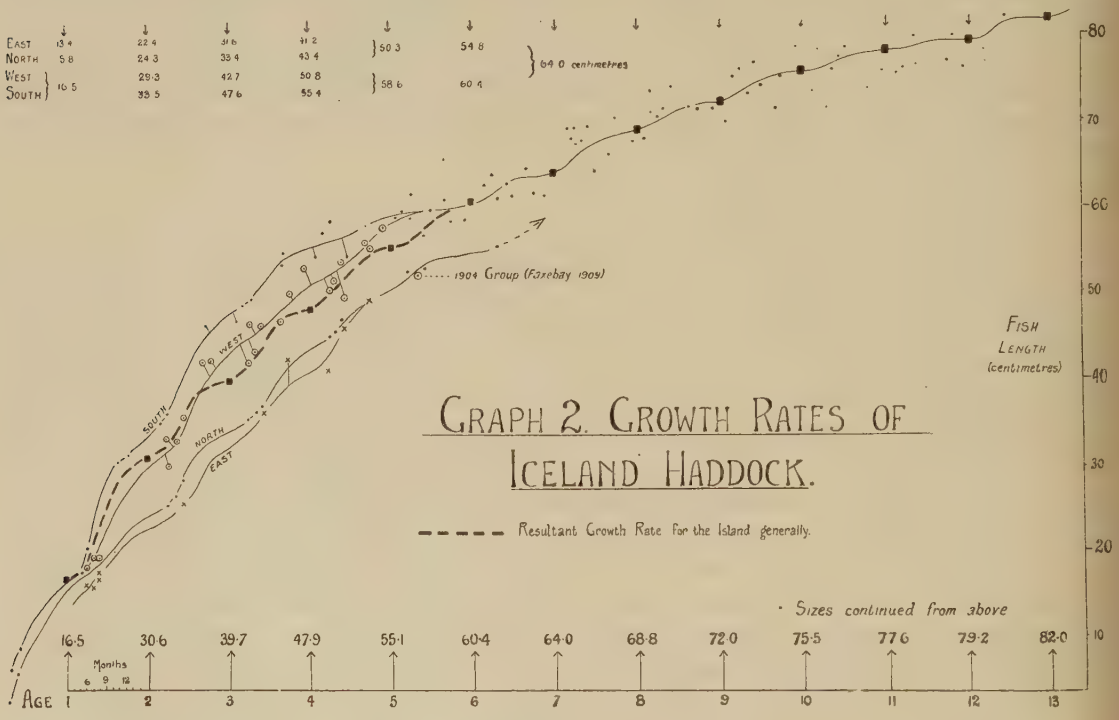
The average temperature on this coast is very low, standing at about 1° C. for great part of the year. In agreement with this growth proceeds most slowly here. There no indigenous stock, but a few brood fish may arrive from the western spawning grounds. abnormal years brood fish may arrive in large numbers, and there is at present insuffent evidence to prove conclusively that these always arrive by way of the north coast. ter the first winter these fish appear, from the characteristics of the scales, to move rtherly and to pass the years of adolescence between north-east and north in summer d winter respectively, until they finally take off for the spawning grounds.

At the end of the fifth year spawning has become general and all Icelandic Haddock gregate on the west and south coasts for spawning purposes. At the first spawning gration it is reasonable to suppose that north coast fish do not penetrate far round to west as a body. In the course of several spawning seasons, however, they might ily lose their identity as a shoal, both by penetrating further and by the modification the direction of their summer feeding migration. In any case the four early growth es cease to be recognisable, although, naturally, there is still a tendency for a year two for the best grown fish to occur mostly to the south.

The conclusion reached here, and emphasised by a glance at Graph 2, is that re are essentially two main types of growth of Haddock at Iceland — those of the th and south coasts. With the south the west coast may be bracketed and with the th the east, although the latter is of little account save in the first year or two of life. s, however, probably adequate to accept only the two main types, taking it for granted t towards their boundaries they will show gradations. One cannot fix definite points division between these two types (typical of warmer and colder water respectively) account of the changes the seasons bring with them. Hvals Bak on the south-east Straumnes on the north-west could, however, be used in this respect.

Graph 3 has been prepared to illustrate the variation in growth rate exhibited the various age groups caught by the "Explorer". The cruise, made in June 1925,

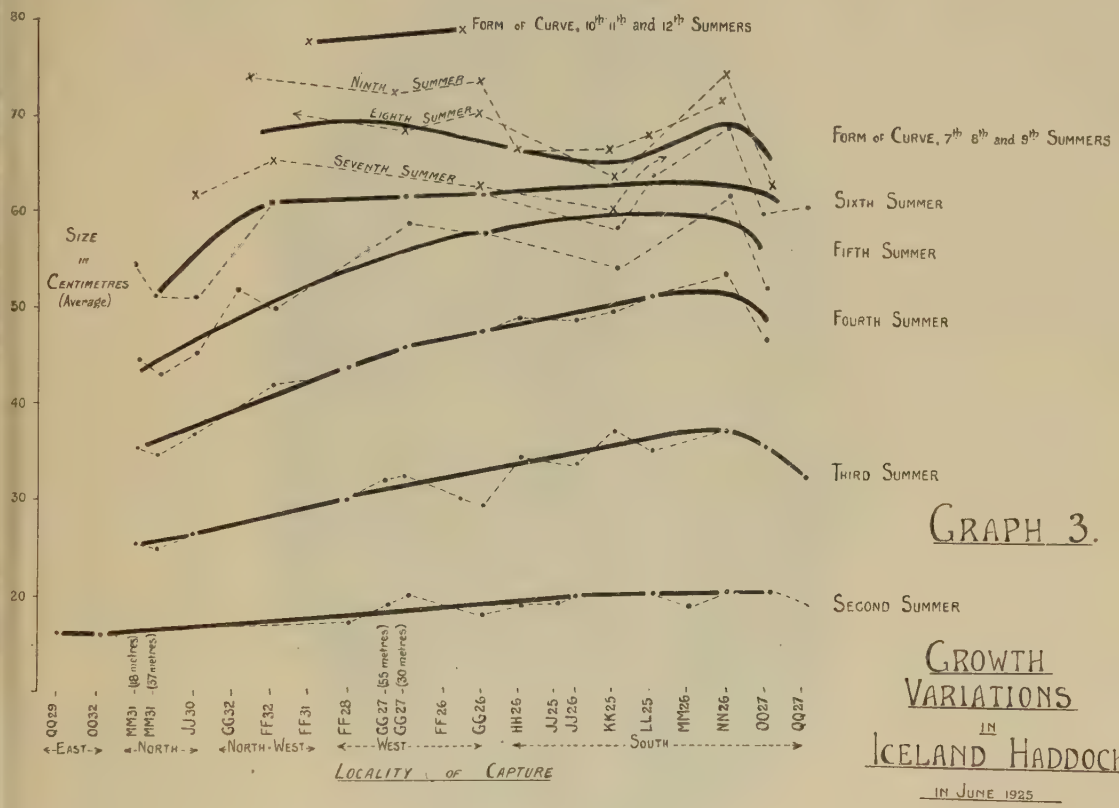
commenced, as has been stated, on the east side of Iceland and followed an anti-clockwise course round by way of north to west and south. All the points at which trawling was engaged in are entered on the graph in sequence. The mean sizes of the age groups are plotted for each position, and a histogram is obtained for each age group. (It has been deemed sufficient in the body of this paper to give the statistical information in the form of readily consulted graphs and condensed tables. These give the gist of the facts necessary for the discussion, and serve to keep the length of the paper within reasonable



bounds. The detailed figures have been filed for future reference, although excerpts to show the methods used and to supplement the Tables are given separately in the Appendix).

The growth rate for the first five years is seen to be a function of locality. Thus it increases all the way round almost to the south-eastern corner of the island, reaching its maximum for each year group at Ingolfs (NN 26), and falling away thereafter towards the east again. Local variations occur. Thus hauls were made in 18 and 37 metres' depth at Skialfandi Bay (MM 31) in the north, and, as is usually the case, the fish in the shallower water were the better grown. This was the case also at GG 27 (Faxebay) on the west coast. The gradient of the curves gradually increases to the fifth summer, by which time a maximum size variation of 19 cms. exists between the best and poorest localities for growth. In the fifth summer there is discernible the commencement of a new phenomenon, doubtless related to the fact that maturity is first reached by many Haddock

at 4 years of age. There appears a sag in the curve, corresponding in position with the western half of the south coast, which is therefore a good feeding ground only for immature fish. In the eastern half of the south coast, including Ingolfs, the adults continue to thrive well up till at least the 9th summer; but more and more of the best southern fish take, after spawning, to the west side and cause the appearance of a new peak on the curve at Faxebay (GG27). This is intensified with increasing age and ultimately nearly all



GRAPH 3.

GROWTH VARIATIONS IN ICELAND HADDOCK IN JUNE 1925

jumbo Haddock desert the south coast for the west and north-west. This change of habitat may be related to a change in the essential diet requirements, and requires investigation. The older fish appear to be less sensitive to temperature changes than are the younger, which develop best on that part of the southern seaboard exposed to the onset of the warm Atlantic current — i.e. the region from Ingolfs to the Horn.

Although jumbo Haddock of over 9 years of age are, according to these records, usually found on the western side, SAEMUNDSSON records a specimen of 104 cms. in length from the south-west, 12 miles N. W. of Reykjanes in the winter 1923—24, and has heard of another of similar size being caught some years earlier at Westmann Isles. These fish weighed approximately 24 lbs. each, and he considers them to be fish of record size. In May, 1927, however, these records were easily surpassed by the capture of a Haddock measuring 112 cms. in length and weighing, gutted, 32 lbs. This fish was

caught between Ingolfs and Portland and was 13 or 14 years old. Judging from the large size of the last few zones on the scale it was still growing rapidly and exhibiting none of the usual signs, seen in scales of nearly all old Haddock, of marked slowing down of growth rate. It must be regarded as an altogether exceptional fish. It is shown in Fig. 4.

Fig. 4. A Record Iceland Haddock. (Length 112 cms).

2. From Intermediate Sizes, calculated from Scale Measurement.

About 6000 scale samples were taken from the Haddock caught during the cruise of the "Explorer", and these alone, on account of the care with which they were selected and their representative character of conditions all round Iceland, are used here. For all the stations trawled over the l_1, l_2 etc. values (obtained from scale measurement and the application of the usual formula) were reduced to mean values. The latter were modified so as to refer to the entire catch, this being necessary since in some cases, especially in the case of young fish, only a portion of the catch could be scale-sampled. Thus,

Table D. Calculated Age Lengths of Iceland Haddock.

	Actual Size (Graph. 3)	From Haddock in						Largest Range of Size
		2nd Summer	3rd Summer	4th Summer	5th Summer	6th Summer	7th, 8th etc. Summers	
	A	B	C	D	E	F	G	
l_1	16.5	15.6 [564] Deficiency 0.9	14.2 [2969] 2.3	14.4 [2573] 2.1	13.2 [1060] 3.3	13.8 [180] 2.7	13.0 [229] 3.5	9—23 (= 15)
l_2	30.6	..	29.9 [2936] Deficiency 0.7	27.1 [2542] 3.5	24.1 [984] 6.5	24.9 [163] 5.7	22.5 [228] 8.1	16—39 (= 24)
l_3	39.7	..	..	37.6 [2579] Deficiency 2.1	35.0 [1010] 4.7	34.2 [141] 5.5	31.3 [228] 8.4	23—59 (= 37)
l_4	47.9	..	..	..	44.6 [1044] Deficiency 3.3	43.3 [152] 4.6	40.6 [226] 7.3	31—64 (= 34)
l_5	55.1	..	..	..	..	51.9 [172] Deficiency 3.2	49.0 [226] 6.1	38—70 (= 33)
l_6	60.4	..	..	..	..	..	57.2 [257] Deficiency 3.2	44—68 (= 25)

For example, if the 2 year old group gave, in a certain locality, a mean size of 30 cms., while the mean size of the individuals selected for scaling was 31 cms., it was necessary to make a deduction of approximately $^1/_{30}$th from the l_1 obtained from the latter in order to obtain the size attained by the group at the end of the first year. This procedure was unnecessary in the case of older fish, which, being less numerous, were all scaled.

The results are summarised in Table D. The number of fish scale-sampled is quoted within brackets. The fish lengths are in centimetres.

Column A of the table shows the actual lengths attained at the end of each year, as read off the resultant curve of growth for the entire area. The "deficiency numbers", representing the apparent loss in size occasioned by the use of scales in estimating intermediate sizes, are also given. These are the corrections which must be added to the various calculated sizes to render them accurate.

As has already been mentioned it is difficult or impossible to obtain within the scope of a short period of years (and a few cruises by research vessels) material which pertains equably to representative portions of an entire area. One of the faults which material collected within a limited time tends to exhibit is that of failing to represent a normal series of year broods. The characteristics of the various broods included here will be discussed later. It is sufficient at this point to make the reservation that the 1921 brood (sampled by the "Explorer" when in its fifth summer) had an unusually northerly distribution in early life and grew, as a result, more slowly than the other broods treated of. Hence in column E of the table the calculated sizes from these fifth summer fish fall on the low side and tend to disturb the otherwise well-sustained upward gradation of the deficiency numbers for years 1 and 2, reading from left to right. As it is intended that the table should meantime serve as a source of the corrections which require to be added to calculated sizes in order to make good the deficiencies from actual sizes,

column E must be used with amendments. The latter may be gauged by taking the means of the deficiency numbers immediately preceding and following column E. This mean for the first year would be $^1/_2$ (2.1+2.7) = **2.4 cms.** That is, instead of adding to the l_1 obtained from a given sample of 5th year Haddock the empirical figure of 3.3 cms. which is too high on account of the northerly bias of the data from which it was obtained, only 2.4 cms. should be added. Similarly only 4.6, 3.8, and 2.3 cms. should be added to l_2, l_3 and l_4 respectively.

The danger of using only one year brood as characteristic of the normal growth rate at Iceland will be seen if the exceptional 1904 and 1921 broods, which spent the greater part of the period of adolescence on the north or east coasts, be studied.

1904 Brood. Calculated Intermediate Age-Lengths.

Size given in centimetres.

Year	From 92 fish in 5th summer			From 110 fish in 6th summer			Normal size for Haddock (Graph 3)		
	Calculated	Add Deficiency	Total	Calculated	Add Deficiency	Total	East	North	West
1.....	12.2	2.4	**14.6**	13.8	2.4	**16.2**	13.4	15.8	16.5
2.....	24.1	4.6	**28.7**	24.3	4.6	**28.9**	22.4	24.3	29.3
3.....	36.0	3.8	**39.8**	32.7	3.8	**36.5**	31.6	33.4	42.7
4.....	45.5	2.3	**47.8**	40.8	2.3	**43.1**	41.2	43.4	50.8
5.....	51.4	(year unfinished)		50.0	..	..	..	50.3	58.6

The fish were trawled from Faxebay, West Iceland, in the summers of 1908 and 1909 respectively, and were therefore in their 5th and 6th summers. Were there no other evidence of the fact it would be most probable, from the sizes obtained from scale measurement, that they spent their early years of life at points between the east and west coasts. Actually we know that this brood was, early in its second summer (1905) found abundantly only on the east side, but that later, in 1908 and still more in 1909, as it approached maturity at the age of 4 or 5 years, it appeared in numbers on the west side, on which, as also on the south, it had originally been almost absent. The 1905 catches of the "Dana" per 10 hours' trawling, together with the relative numbers taken by a commercial trawler in 1908 and 1909, are indicative of the course of events:—

Year	West	North	East
1905	41	10	5067
1908	1039*	No record	No record
1909	4023*	—	—

* These are the relative numbers caught in 1908 and 1909. Lack of data as to the number of hours' fishing precludes their reduction to a 10 hours' fishing basis.

From the corrected sizes it is probable that by the second summer the east coast was largely forsaken by this brood for the north and west. The figures of the 6th summer

fish also suggest that the 3rd — 5th summers were spent between the north and west coasts — chiefly on the north; whereas the section of the brood reaching Faxebay one year earlier (and probably maturing one year earlier) had in the third year found its way to the west. At all events the actual average size of the 1904 brood as found in Faxebay in 1909 was relatively much less than was to be expected from the sample taken there one year previously and can only be accounted for by the subsequent arrival of the slower growers, maturing one year later than their forerunners.

Along with the 1904 brood representatives of the 1900—1907 broods were taken in the same hauls. None of these showed a similar discrepancy, the increment made between 1908 and 1909 being normal in all cases. It is reasonable to conclude, from the normal nature of the means of these broods, that between 1900 and 1907 only the 1904 brood was in its earlier stage distributed abnormally round the coasts. For the period 1908—1914 there are insufficient data from which to draw conclusions in this respect. From the more copious recent material, relating to the broods from 1915 onwards, it is evident that 1921 produced another brood of poorly grown Haddock. The main body of this age group seems to have been distributed towards the north coast during the first two years of life. For the other broods there is some indication that those of 1915 and 1918 were more than normally distributed to the north. The data for the 1921 brood are:—

1921 Brood. Calculated Intermediate Age-Lengths.

Sizes in centimetres.

Year	From 161 fish caught in south			From 795 fish caught in north			Normal Sizes Graph 3		
	Calculated	Deficiency	Total	Calculated	Deficiency	Total	North	West	South
1.....	13.5	2.4	15.9	13.4	2.4	15.8	15.8	16.5	16.5
2.....	27.5	4.6	32.1	23.9	4.6	28.5	24.3	29.3	33.5
3.....	41.5	3.8	45.3	35.1	3.8	38.9	33.4	42.7	47.6
4.....	53.6	2.3	55.9	44.2	2.3	46.5	43.4	50.8	55.4

This brood as was shown by the "Explorer" catches occurred chiefly in the north. From the calculated intermediate sizes it would appear to have, during the first four years of life, been located chiefly as follows:—

	1st year	2nd year	3rd year	4th year
Caught in south, June 1925	W + N	W + S	W + S	W + S
— - north, — —	W + N	W + N	W + N	N

N = North. W = West. S = South.

It is suggested therefore that the main body of the group grew, up to the adult stage, in the north-west and north.

The remaining more recent broods show little deviation in their mean growth rates from the normal. Slight variations are, however, suggested with regard to the time and degree of distribution towards the north coast. From a study of the calculated sizes of these broods, on the same lines as for those of 1904 and 1921, the following course of events is indicated:—

1920 Brood:— A year of poor survival — spent its first year in the south and west — a portion migrated to the north in the second year and did not return before maturing.
1921 Brood:— A year of high survival — distribution as detailed above.
1922 Brood:— Survival value very high — first year spent in south and west — the main body moved to the north in the second year and remained. Thus the average catch in the fourth year in the west and south was 468, and in the north 1833 (per 10 hours).
1923 Brood: — Survival value moderate — spent first year in south and west — very few found their way to the north in the second year — the south and west disposition was maintained in the third year.
1924 Brood:— Similar to 1923.

The normal distribution of the bulk of the 0-group appears to be along the south and west coasts, where spawning occurs. In abnormal years such as 1904 and 1921 our material seems to suggest that there occurs accentuated drift to the north and even to the east. In the latter case the east coast is soon deserted for the north (in the second year). Broods reaching the north in the first or second year remain there for the most part until they mature. In cases where the north is not reached during the first year by drift of fry, that coast may be sought out in the second summer — e.g. by the 1922 brood: on the other hand it may not be colonised in any degree of intensity at all (e.g. broods 1923—24). It may safely be said that early in life the position is taken up which will affect the rate of growth of the Haddock up till the 4th or 5th year.

When larger Haddock occur on the east coast they are summer immigrants. For example at Hvals Bak, towards the south-east, the source of derivation is obviously the south coast. This is apparent from the calculated growth rates of such fish:—

Calculated size, from 3rd year fish, for 1st year ..... = **14.1** (2.2 deficiency) = **16.3**
Calculated size, from 3rd year fish, for 2nd year..... = **33.8** (0.7 deficiency) = **34.5**
Normal size for south coast Haddock, 1st year ..... = **16.5** and for 2nd year = **33.5**

On the northern side of the thermocline on the east coast, however, the source of these immigrants appears to be the north coast. It is only in certain years, late in autumn that Haddock of larger size find their way to the north-east in anything like considerable numbers. When they do they probably accompany an unusually strong inflow of Atlantic water along the north coast. Thus in December 1922 a trawler landed at Aberdeen a catch from Langanaes. These fish proved on age analysis to be practically all members of one brood — that of 1918, which was very scarce elsewhere on the Icelandic coast. This is a feature of north and east coast catches of Haddock — that they tend to consist of one or two predominant year broods, which have had a northerly east while young. The Langanaes fish mentioned gave the following calculated growth rate:—

Year 1. Calculated Size 12.6 cms. Deficiency Correction, 2.4 Total = **15.0** (Normal for North = **15.8**)
— 2. — — 22.1 — — — 4.6 — = **26.7** — - — = **24.3**
— 3. — — 31.3 — — — 3.8 — = **35.1** — - — = **33.4**
— 4. — — 41.8 — — — 2.3 — = **44.1** — - — = **43.4**

It is therefore probable that these fish were distributed to the north coast as yearlings and remained there during the adolescent stage.

Section VIII. The Annual Recruitment of the Haddock Stock at Iceland by the successive Year Broods.

The data for Iceland are insufficient for seasonal quantitative analysis, but as the locus of the fishing fleet changes with the seasons the commercial figures are to some extent expressive of the general numerical frequency of the stock at points where considerable density is attained. Having been taken in May—July the data from the research vessels unduly weight the results, in the table given below, in the seasonal sense. The existence side by side of the commercial results, taken rather locally all the year round, with those from research vessels, taken at one season but at all parts of the coast therefore has the value of the one set of results checking the other with regard to their order. It will be seen that in both cases the order of the frequencies varies within much the same limits (zero to several thousands per 10 hours' fishing).

In Table E the average brood catches per haul per 10 hours' commercial otter trawl fishing are grouped separately for south and west, north, and east coasts. The number of observations contributing to each average figure is quoted in parenthesis. Research vessel results are printed in heavy type, and are of special value in that they give an accurate picture of the youngest age classes, and also because the age assessment was made entirely by the means of scale reading.

In certain cases, which are specified in the table, the figures quoted do not refer to a standard time of fishing, since the number of hours' fishing was not specified. Such figures have some value in suggesting the relative frequency of the broods to which they refer. The more recent "Dana" figures, obtained from the results of a smaller trawl, have been brought into line by the use of a conversion factor. Fishing on the north and west coasts, in the early summer of 1924 and 1925 respectively, the "Dana" and the "Explorer" caught, the one with the 50' otter trawl, the other with the 60' otter trawl, the following average numbers of the year broods present on the grounds:—

	Brood	1924	1923	1922	1921	1920
North	"Explorer"	4	178	5388	2330	48
—	"Dana"	3	111	836	115	2
West	"Explorer"	2103	2369	157	39	14
—	"Dana"	227	318	23	1	0

Totals — "Explorer" 12630 per 10 hours' fishing
"Dana" 1636 - - — —
Ratio — "Explorer": "Dana" = 8:1 (for Haddock up to 5 years of age)

Table E. Average Catches per 10 Hours' Otter Trawl Fishing in Icelandic Waters.

The number of records contributing to the Averages is quoted in brackets. Research Vessel Records given separately in heavy type.

Age Group			1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	192
In First	Year	South and West Coasts	..	..	..	..	..	..	..	..	..	.. ..	..	..	**352**
- Second	—		..	..	..	..	..	..	..	..	35 (5)	474 (3)	**2512** (9)	**4191** (27)	**1417**
- Third	—		..	..	..	..	..	..	..	26 (4)	280 (9)	110 (5)	**1970** (27)	**3128** (5)	..
			..	..	..	..	..	..	..	..	..	**3920** (9)	..	..	..
- Fourth	—		..	..	..	..	..	..	11 (5)	54 (7)	130 (6)	**200** (7)	**496** (5)	..	..
			..	..	..	..	..	..	..	..	**240** (9)	..	..	..	..
- Fifth	—		..	..	..	..	..	114 (5)	39 (6)	80 (6)	**27** (7)	..	..	..	..
			..	..	..	..	..	..	..	**8** (9)	..	..	..	..	..
- Sixth	—		..	..	..	..	43 (5)	72 (7)	30 (6)	**19** (30)	..	..	..	..	..
			..	..	..	..	..	..	**8** (9)	..	..	..	..	..	..
- Seventh	—		..	..	..	214 (5)	53 (7)	76 (6)	**3** (30)	..	..	..	..	..	..
			..	..	..	..	..	**24** (8)	..	..	..	..	..	..	..
- Eighth	—		..	..	..	82 (6)	19 (6)	**3** (30)	..	..	..	..	..	..	..
			..	..	*	..	**5** (9)	..	..	..	..	..	..	..	..
- Ninth	—		..	..	..	64 (6)	**8** (30)	..	..	..	..	..	..	..	..
			..	*	*	**8** (5)	..	..	..	..	..	..	..	..	..
- Tenth	—		*	..	**8** (5)	**4**(30)	..	..	..	..	..	..	..	..	..
			..	*	*	..	..	..	..	..	..	..	..	..	..
- Eleventh	—		*	..	**3** (30)	..	..	..	..	..	..	..	..	..	..
			..	*	..	..	..	..	..	..	..	..	..	..	..
- Twelfth	—		*	**3** (30)	..	..	..	..	..	..	..	..	..	..	..
- Thirteenth	—		**0** (30)	..	..	..	..	..	..	..	..	..	..	..	..

* Commercial catches omitted. On account of their concentration upon grounds in which older Haddock tend to be rather more frequent than in those sampled by Research Vessels generally, rather a higher average catch of the older age groups occurs. Scale reading at advanced ages becomes more difficult and an error of a year either way can occur in age estimation. The following estimates of the average catch per 10 hours for the various groups (commercial vessels) were made:—

8th	Year	53 (5 records)
9th	—	23 (10 —)
10th	—	29 (14 —)
11th	—	16 (13 —)
12th	—	11 (7 —)

i. e. five or six times the numbers shown, by research vessels, to pertain for the area generally.

This ratio was used as an approximate working factor in raising the results from the smaller trawl to a basis comparable with that of the commercial trawl. In addition to the figures given above the "Explorer" took, on the west coast, 44 Haddock of over 5 years of age. The smaller trawl took none, so that for older Haddock it is unreliable as a sampling instrument.

Table E (continued).

Age Group		1919	1920	1921	1922	1923	1924	1925
In First Year	North Coast	..	..	..	..	..	..	**160** (3)
- Second —		..	..	..	..	**56** (7)	**20** (12)	**440** (10)
- Third —		..	..	..	**5280** (7)	**341** (12)	**274** (10)	..
- Fourth —		..	..	**2320** (4)	**5794** (9)	**56** (10)	..	..
- Fifth —		..	**320** (7)	**1975** (9)	**422** 10)	..	..	..
- Sixth —		**0** (7)	**48** (3)	**48** (10)	..	..	..	..
- Seventh —		**0** (3)	**0** (10)	..	..	..	..	..
In Second Year	East Coast	..	..	..	..	**80** (1)	**94** (5)	..
- Third —		..	..	..	**0** (1)	**0** (5)	..	..

Table E (continued).

Age Group		1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908
Caught in 1903....	South and West Coasts	..	..	?	480?	1840	720	40	..	..	..	..	..	..
— - 1904....		..	..	?	896?	128	152	232	1064	..	..	..	..	..
— - 1905....		..	..	?	160?	72	24	0	904	328	..	..	..	..
		Average		?	512?	680	299	91	984	328	..	..	..	..
Caught in 1908....		2	3	21	55	43	56	147	651	1039	636	381	580	1
— - 1909....		0	6	51	78	146	98	106	988	4023	669	1048	3249	3
Caught in 1908 + 1909		2	9	72	133	189	154	253	1639	5062	1305	2329	3829	4

The results for years 1903—05 were obtained from examination of modal sizes and partition therefrom of the frequency distribution — no scales were available. Some error is possible in estimating the 1898—99, the older, broods. The 1908—09 results were from catches scaled on board a commercial trawler — hence the presence of older Haddock than appear in the 1903—05 results, which refer to the small 50′ trawl. All the 1908 Haddock were scaled, and one-third of those taken in 1909. None of these results are computed on 10 hours' fishing basis.

On account of the rather heterogeneous sources of the figures in the table, they will be sufficiently utilised if they can be made to yield fairly reliable indications of

(a) the relative productivity of the various broods on the different coasts and

(b) the relative shoal density of Haddock at Iceland as compared with that in other regions,

leaving out of account any attempt to estimate the rate at which a brood is eliminated from year to year.

Table E (continued).

Age Group		1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907
Caught in 1903....	North Coast	..	..	..	230	30	0	10	..	..	..	..	..
— - 1904....		..	..	30	42	0	10	0	2	..	..	..	..
— - 1905....		..	..	..	..	..	0	0	334	10	..	..	..
Caught in 1903....	East Coast	..	..	?	6480?	0	0	30	..	..	..	..	..
— - 1904....		..	..	?	116?	88	0	6	15	..	..	..	..
— - 1905....		..	..	..	..	..	0	0	25	5067	..	..	..
— - 1908....		..	..	..	..	..	..	..	..	..	..	2	1230

All of these results represent the catch per 10 hours' trawling, with the exception of that for 1908, which refers to a seine net catch of similar duration. No scales were available so that here again some dubiety exists in the exact partition of numbers between the 1898—99 groups.

The relative productivity of broods is usually best studied from the numbers in which they are caught, by standard apparatus in standard time, during the first three years of life. In the North Sea, where much more intensive work of this kind has been done, it is a notable fact that the average standard catches for the second and third years of life are little less than those for the first year. After the third year the catches tend to be diminished by a little more than one-half per year.

The nature of the figures in the table is such as to confirm the above findings for the North Sea. The results from the south and west coasts fail to show much evident diminution of numbers before the fourth year; from those for the north coast, where little trawling is done and the Haddock largely inhabit protected waters, it appears to be at least one year later before diminution is apparent.

Regarded alone the data for Iceland might be said to be far from adequate to serve as the basis of any quantitative observations. Since, however, somewhat analogous results have been obtained in the North Sea, as the result of really intensive sampling, it seems to be permissible to draw several tentative conclusions.

In the latter region the collection of statistics, both from commercial and research vessels, has now been in progress for a fair number of years. On an age analysis of these statistics being made it is found that the various year broods repeatedly show, from one year to another, remarkably consistent characteristics, among which there is especially to be noted that of relative density of numbers.

It will be shown in a future paper that in the case of the North Sea a "normal" year of brood production is one which, during the first three years of life, tends to give average catches all over the area of about 1500 Haddock per 10 hours' trawling. In other regions Haddock are more or less numerous as the case may be, and the "normal" figure must be placed at greater or less than 1500 accordingly. At Iceland it appears that the numerical density existing in the North Sea is exceeded (although of course the fish are relatively much larger age for age), and that a higher normal figure must be selected.

The following density scale is suggested, meantime, as giving criteria of the relative productivity of the age classes:—

Average	Catch	approx.	500	per	10	hours'	fishing	—	brood	type	Poor.
—	—	—	1000	-	—	—	—	—	—	—	Moderate
—	—	—	2000	-	—	—	—	—	—	—	Normal.
—	—	—	4000	-	—	—	—	—	—	—	Good.
—	—	—	6000	-	—	—	—	—	—	—	Very good.

Twenty-six year broods in all are investigated in the table. Of these twenty-one, comprising 1898—1908 and 1916—1925, are well enough sampled to render their quality fairly clear. Only the broods from 1920 onwards were adequately sampled during the first three years of life, and the results bearing upon these have most value. The figures referring to one or other of the first three years of life of the 1901—1907 broods either do not refer to the catch per 10 hours' fishing or if they do were obtained without the aid of scale samples by the comparison of the modal sizes with the means of Graph 3. From the 1908—1909 material over 7000 scales were examined and showed that the broods from 1896—1907 were present. In the absence of figures for standard time these are only of assistance in showing the comparative frequency of these broods. In such a long period of years it is most likely that at least one brood would fall within the "very good" class, and since the 1904 class stands out pre-eminently it is reasonable to suppose that it was of this type. If so then the 1898, 1899, 1900, 1903 and 1907 broods must have been of the normal or good types, and the 1896, 1897, 1901, 1902, 1905, 1906 broods of the poor or moderate types. There is fairly close agreement between the nature of the results (for the south and west coasts) from the 1903—1905 and the 1908—1909 experiments. In particular it is worthy of note that the 1904 brood, so plentiful later on in the south-west appeared there in 1905 in very moderate numbers.

The remaining data for these age classes refer to the north and east coasts. On the east coasts the 1907 and 1904 broods appear to have occurred, during the first year or two of life, in considerable numbers; apart from these the 1899 brood (or it may have been that of 1898 — no scales were available for more exact determination) was found well to the south of Langanaes, at PP30, in considerable numbers. In the north this brood along with that of 1903, appears to have been most successful. The 1904 brood however is not prominent in the 1905 catches and was evidently largely confined, in the first year or so of life, to the east.

Turning now to the better sampled more recent broods (1920—1925) it is evident that those of 1920 and 1925 were "poor" or "moderate" all over the island; 1923 normal in south and west, poor elsewhere; 1924 "good" in the south and west, "poor" elsewhere; 1922 "very good" in the north, "poor" elsewhere, except very possibly the south and west, where the "Dana" figures are in disagreement, and as they relate chiefly to one locality, Faxebay, may be overlooked in favour of the 27 experiments made all round these coasts by the "Explorer" in the following year; and 1921 "good" or "normal" in the north, "poor" elsewhere.

Much less certainty may be attached to the data for the broods 1916—1919,

which were sampled only in the later years of life. We do not yet know the rate of diminution in numbers of the Haddock age groups at Iceland, and cannot estimate the probable numerical density of these broods when younger. By comparison of the figures, however, one might term the 1916 brood "good", that of 1919 "poor" and those of 1917, 1918 "moderate". All these groups were, at the time of the experiments, too old to be found in numbers in the north and east, although the earliest commercial samples (Dec. 1922) showed that the 1918 brood was most common in the north-east. The data for compilation of the catch per 10 hours were, however, lacking.

Summing up, with regard to the highest degree of success achieved on any coast, we find the broods distributed as follows:—

Poor:— 1901, 1902, 1908, 1909	= 4
Moderate:— 1905, 1906, 1917, 1918, 1920, 1925	= 6
Normal:— 1898?, 1900, 1907, 1923	= 4
Good:— 1903, 1916, 1921, 1924	= 4
Very Good:— 1899?, 1904, 1922	= 3

Or, examining the groups with reference to locality, we may further differentiate them as follows:—

The entries for the north and east coasts show a marked preponderance of "poor" years. In the east only four broods out of ten occurred in any numbers and in the north only six out of thirteen. It may eventually prove to be the case that only one brood out of every two or three ever reaches the north or east in any numbers, and only one out of five or six in very great numbers, corresponding in the latter case to the main body of the brood. In the south and west, on the other hand, fourteen out of twenty-one broods were moderately successful or even more so, so that one in every three is the present estimate of the more unproductive broods. Of the whole twenty-one broods only three appear to have been exceptionally productive on any part of the coast. About the same number appear to have had little success all round the island.

It is thus indicated that it is the normal occurrence for a new brood to be distributed over the south and west coasts, which offer a very extensive seaboard where the conditions are rather uniform, and there is no reason to suspect that congestion of the shoals might occur. The conditions on the northern and eastern coasts are more variable and it is possible that some of the results reached above are prejudiced by the chances of locating or missing dense local concentrations of fish.

The tables further make possible the following suggestions:—

1. There are possible many kinds of combinations of quality of brood and its distribution, so that the definition of "normal" conditions becomes a matter of considerable difficulty. At present the best that can be done is to define a "normal" brood year as one which produces, during the first three years of life, an average catch of approximately 2000 Haddock per 10 hours' fishing on the south and west coasts, and an "abnormal" brood one that is unduly distributed while young to the north and east coasts, or one that, distributed normally on the south and west coasts provides

able F. Contributions to Stock by the 1898—1908 and 1916—1925 Broods of Iceland Haddock
(with quality of the same broods as estimated for the North Sea).

Year Brood	South and West Coasts	North Coast	East Coast	North Sea
1898.....	N?	..	..	..
1899.....	N?	M	*VG*	..
1900.....	N	P	P	..
1901.....	P	P	P	M?
1902.....	P	P	P	N
1903.....	G	M	P	M
1904.....	P	P	*VG*	*VG*
1905.....	M	..	..	N
1906.....	M	..	..	P?
1907.....	N	..	M?	M
1908.....	P	..	..	P
1916.....	G?	..	..	M?
1917.....	M?	..	..	M?
1918.....	M?	M?	M?	N?
1919.....	P	..	..	G
1920.....	P	M	..	*VG*
1921.....	P	G	..	P
1922.....	M	*VG*	..	P
1923.....	N	P	P	*VG*
1924.....	G	P	P	N
1925.....	M	P	..	M

P = "poor" M = "moderate" N = "normal" G = "good"
VG = "very good".

nsiderably greater or lesser average catches than the figure mentioned. As regards owth rate the south and west coast curves in Graph 3 are therefore to be regarded as pical for Iceland.

2. That the 1921, and to a less extent the 1922 brood, as concluded from scale easurement, soon migrated in great part round to the north coast; and that the 1923—24 oods remained in the south and west.

3. That of the post-war broods (1919—25) the first two were unproductive, but re followed by four productive years, whose only limitation was that the growth rate two was retarded by a sojourn in the north. The 1925 brood was again rather unpro-ctive. Thus there were, following the recuperative war period, at the close of which e average catches were very high, two unproductive years, and these took effect on e catches made in the years immediately following. The resulting temporary decline in e catching power of commercial vessels, which has lately disappeared, was prolonged by e northerly location of the productive 1921—1922 broods, and also by their slower

rate of growth. These biological observations afford, at least in part, an explanation of the course of the fishing. The gradual working back to the west and south of the 1921—22 broods and the normality of those of 1923—24 have again served to raise the standard catch and to lessen the number of days required by commercial vessels to complete a "voyage". We are still only on the borderland of a complete and unequivocal study of this problem of brood variation. It is already evident, however, that a more thorough knowledge of the periodicity in the accession of the various types of year broods, along with their early distribution, is of paramount importance and can scarcely fail to enable increasingly accurate forecasts of the course of the Haddock fishing to be made for several years ahead. The Icelandic Haddock fishery reacts in particular very sensitively to the periodicity in question. This is so since the major portion of the commercial catches consists of young immature Haddock (whose age, incidentally, is determinable with absolute accuracy) whose location appears to be fairly definitely fixed from the second to the fourth or fifth summer.

Despite the great number of Haddock which have been removed annually from the limited Icelandic plateau there is according to Saemundsson no apparent decrease of the stock to be observed from the Government statistics. The mere facts that there are periods of relative scarcity and abundance, and that the fishery is largely dependent upon immature Haddock, support the conclusion, reached from other criteria, that the various year broods are unequally successful from a productive point of view. They begin to provide fish of marketable size at only 15 months of age and are composed of good medium fish as early as the third summer of life.

The effect of intensive fishing at Iceland may well, on these accounts, be more felt than in the North Sea, which is an extensive plateau, and where the broods are, in addition, later in reaching marketable size. At Iceland the shoals are rather localised at any one time of the year and the efforts of the fleet are directed at these points of density. In mitigation of these factors aiding rapid elimination of the stock it must be noted that there is a great portion of the coast so rocky as to prevent trawling, and to serve as a possible sanctuary for Haddock.

4. That there is, save perhaps in the special success of the 1904 brood, practically no coincidence of years of similar brood type in the North Sea and at Iceland. Rather is there consistent dissimilarity. Apart from the marked difference in growth rate and the characteristics of the scales (to be compared below) there is here further proof that Iceland and the North Sea must be reckoned as areas carrying independent stocks of Haddock.

Section IX. Biological Considerations.

1. Characteristics of the Scales of Iceland Haddock.

a. With Regard to their Growth.

According to Graph 1 the scales of Iceland Haddock vary, as regards their relative size to that of the fish they represent, in much the same manner as do those of the North

Sea. Particularly noticeable in the case of Iceland, where many large fish are available, is the apparent acceleration of relative rate of scale growth after the Haddock pass a certain size — probably a little over 40 cms. This may explain why the scales of large Haddock have, on the body of the fish, a coarser or rougher appearance than is the case with younger fish.

The data also provide further proof that there is no material compression of the inner portion of the scale, as Lee (5) suggested might be the case, owing to the sphincter action of new zones laid down to the exterior. Were the original first year zone of the scale (v_1) to be 100 units in length and to be compressed later on to 90 units, there would be, using for calculation v_1 from the scales of the older fish, a loss of 10 per cent. in the actual size of the fish — i.e. l_1 — when it was one year of age. Such a contingency was found (Thompson, 12) not to arise, and other explanations of the apparent deficiencies in the estimated sizes of l_1 from older fish had to be sought for. It is noteworthy that as well as exhibiting skeletal annuli, the scales also show radiating limy struts whose presence would tend to counteract inward pressure by supporting the annuli.

The following table shows the actual average sizes of the zones of the scales taken during the "Explorer" cruise, June 1925.

Table G. An Analysis of Intermediate Zonal Sizes of Haddock Scales. (Iceland June 1925).

Taken from Brood	Mean Size of Scale in Units (0.01 mm) at the end of Year								No. of Specimens
	1	2	3	4	5	6	7	8	
1924 (2nd summer)	101	..	..	..	..	..	..	..	305
1923 (3rd —)	88	180	..	..	..	..	..	..	2690
1922 (4th —)	91	165	238	..	..	..	..	..	2301
1921 (5th —)	87	157	230	293	..	..	..	..	871
1920 (6th —)	94	175	260	332	387	..	..	..	43
1919, 1918 etc.	92	171	237	295	372	423	476	515	30
Mean Size, all broods	90	171	237	296	381	423	476	515	6240

The high v_1 for 1924 is due to the fact that practically all the Haddock relating to that brood were taken from the south and south-west, the regions of greatest growth. Otherwise the first year scale sizes are fairly near the average figure of 90 units. In 1923 the grouping of the brood was probably more westerly than southerly, and in 1921 still more so, with a tendency to being northerly. In the second year the local differences become more pronounced — in agreement with the conclusion already reached that the 1922 brood and still more so that of 1921, pushed round to the north coast and did not grow so quickly as those broods (1923, 1920) which remained as a body on the south and west coasts. This becomes still more obvious from the third and fourth year figures. The northerly location of the 1921—1922 broods therefore persisted whereas the 1920 brood

maintained its position in the region of faster growth. All of this corroborates what was deduced above from the actual fish sizes. There is, indeed, no case for scale compression. The oldest fish (1920, 1919, 1918 etc. broods) actually have v_1 values of 94 and 92, which are above the general mean.

These average scale sizes may be applied to the resultant growth curve (Graph 3) of Icelandic Haddock, and the corresponding fish sizes they represent may be read off. The first four years, which alone are represented by sufficient scale samples to give fair accuracy, are found by this means to yield the following sizes:—

Year 1. (v_1 = 90 units). l_1 = **15.2** centimetres. Deficiency from 16.5, the probable actual size = **1.3** cm.
— 2. (v_2 = 171 —). l_2 = **27.2** — — — 30.6, - — — — = **3.4** -
— 3. (v_3 = 237 —). l_3 = **37.0** — — — 39.7, - — — — = **2.7** -
— 4. (v_4 = 296 —). l_4 = **45.6** — — — 47.9, - — — — = **2.3** -

These results lend direct support to the growth rate arrived at on Graph 3, and serve further to emphasise the abnormality of the exceptional 1904 brood.

b. With Regard to their Structure and Number of Sclerites (or annuli).

In their microscopic characters the scales of Iceland Haddock differ in some details from scales of North Sea Haddock. The fact that growth is usually much more rapid is represented by the greater width apart of the so-called "growth rings" (sclerites or annuli). The calcareous ridges which constitute the boundaries of these sclerites are wider, or more massive, than is the case in North Sea fish. Again there is not the same degree of progressive narrowing of the sclerites towards winter. North Sea scales normally show this narrowing quite distinctly, the winter sclerites thus being sharply defined from the broader sclerites laid down both in the preceding and ensuing summer. In the Iceland scale the transition from winter to summer is much less clearly defined, except in the case of the first winter. Indeed it is the usual occurrence, on the south and west coasts at all events, to have merely one or two slightly narrower sclerites separating zone from zone. On these particular coasts there is a difference of only 2—3° C. between the temperature of the water in summer and winter, and growth apparently proceeds nearly all the year round. By contrast, Haddock on the north and east coasts, where summer and winter temperatures are markedly different, have scales in which summer and winter growth are extremely well differentiated. The interpretation of age from such scales is accordingly a simpler matter than it is from scales of south-western Haddock. In the north and east, as is the case in the North Sea, growth practically ceases in the winter months. Even in June it was found that the Haddock of Skialfandi Bay in the north had not recommenced growth — there were no new spring sclerites added to the scales. By this month, on the other hand, growth on the south and west coasts had vigorously recommenced, there being five or six new sclerites already formed on the scales, representing an addition to the fish length of several centimetres. In proceeding from north to south by way of west one found that there was a gradual increase in the amount of such new growth as the south coast was approached. The temperature of the

water rose in the same direction. The influence of temperature, either in encouraging the production of a food supply for the Haddock, or in stimulating the latter to feed, or both, is thus shown to be of the highest importance. It may be that there is a limiting temperature below which, if feeding is possible or even desired, growth of the fish does not result. In this connection it is interesting to note that the temperature in the north at the point where, although feeding was going on, no new growth had occurred, was from 4—5° C. That in the south, where new growth was well advanced, was 7° C. Experiments in the aquarium might determine whether there is a limiting temperature in the region of $4^1/_2$° C. below which growth of Haddock, whatever the available food supply, is inhibited or at most infinitesimal.

It follows that northern Icelandic Haddock must, during the short summer, find very good conditions for growth. In July and August, when the inflow of warmer water has occurred, Haddock are found to be feeding on sand-eels and capelin, whereas earlier in the year the diet is much poorer, being restricted to brittle-stars and annelids. It is therefore in the summer months that jumbo Haddock from the west find it profitable to make feeding incursions along the north coast.

Schmidt (9) found from the examination of young Iceland Haddock that the average number of vertebrae is 54. This agrees with the figure given by Day (2) for the North Sea and with that found by myself in a few White Sea and Canadian Haddock. There is no suggestion in these results of the existence of fundamental racial skeletal peculiarities in the Haddock even in widely separated and self-contained portions of its habitat. However, it is possible, if not from the growth rate alone, then from the numbers of the annuli in the scale zones, to obtain sufficient diagnostic evidence of the approximate source of a given sample of Haddock.

From part I of the table it is seen that the Icelandic is distinguished from the North Sea scale by having rather fewer sclerites in its first year but considerably more in its second. It might, however, be confused with the Faroe scale but for the slight difference in the first year and the numerical superiority established in the later years of life. Similarly there are but slight differences between the numbers of sclerites in North Sea and Norwegian Haddock respectively.

Table H.

I. The Average Number of Sclerites in the Successive Scale Zones.

Region	Year										
	1	2	3	4	5	6	7	8	9	10	11
North Sea	22	$15^1/_2$	12	9	$8^1/_2$	8	7	7	6	..	..
Norway	20	14	$13^1/_2$	13	9	8	7	$6^1/_2$	6	..	..
Faroe	22	19	$16^1/_2$	14	$11^1/_2$	10	$9^1/_2$	$7^1/_2$	..	..	..
Iceland	$20^1/_2$	$20^1/_2$	16	$14^1/_2$	14	14	14	11	10	6	4
Irish Coast	26	19	16	$13^1/_2$	12	$10^1/_2$	10	..	..	..	..
Nantucket, U. S. A.	23	24	18	15	..	..	..	..	..	..	..

II. Variation in the Average Number of Sclerites in Different Broods at Iceland.

From 6240 specimens taken at Iceland, June 1925.

Brood	Year				
	1	2	3	4	5
1924.....	23.6	..	..	..	..
1923.....	22.8	23.6	..	..	..
1922.....	18.8	18.3	15.6	..	..
1921.....	19.1	17.1	16.9	14.4	..
1920.....	21.8	19.0	17.8	16.0	12.0
1919 etc.....	21.8	17.5	17.2	16.5	15.9
All Broods...	20.4	20.5	16.0	14.6	13.8

Part II of the table tends to confirm the observations already made, in connection with the scale sizes and fish lengths of the various broods, upon the location of these broods. Thus the 1921 and 1922 broods have the smallest number of sclerites throughout and would appear to have spent even the first year well to the north-west of the island.

2. The Position of the Spawning Grounds, and the Age of Iceland Haddock on reaching Maturity.

The Haddock spawning grounds at Iceland are, as elsewhere, determined partly by the prevailing temperature. Schmidt (9) gives the minimum favourable temperature as $5^1/_2$° C. and the conditions are such that this temperature does not occur in April (the chief month for Haddock spawning at Iceland) north of 66° latitude. Spawning is therefore confined to the south and west coasts, the water of the east coast being very much colder than the minimum required. According to Saemundsson (8) the Haddock after spawning proceed in spring towards the colder waters of the north-west, north and east coasts in search of food. The following movements, which he thinks typical, are worthy of restatement here:—

January—April:— The large spawning fish, whose average size according to Schmidt is about 55 centimetres (and average age therefore about 5 years) assemble and spawn in depths of from 80 to 150 metres.

May—June:— These fish, now spent, enter shallower water (on the south and west coasts) feeding on great shoals of the lesser sand-eel.

July—November:— They then migrate to deeper and more distant waters, northerly and easterly. (The medium and smaller fish which are presumably mostly immature and which have remained in deeper water move inshore and give rise to the summer and autumn fishing in the shallower waters of the south and west coasts).

December:— The larger fish reappear from northerly and easterly, where they appeared about July seeking their customary food of sand-eels, capelin and invertebrates, and remained, along with the more stationary young fish growing up in these parts. The maturing young fish accompany the large Haddock to the south-west spawning grounds.

This general outline of the movements affords a rational survey of all the phenomena and is confirmed from a close study of the scales and growth rates of the year broods. Migration only becomes extensive when maturity is first reached. This probably does not occur much before the age of five years, when an average size of 55 cms. is attained. Thereafter the mixing of growth types becomes so general that it is no longer possible to establish differential growth rates for south-west, north or east coast fish. The distance traversed by north coast Haddock to the spawning grounds cannot be much less than 100 miles, and may be considerably more. It is possible that the necessity of such an extensive movement is a factor in postponing the time of first maturity, for in the North the Haddock spawn for the first time at the average age of three years. As, in addition, the latter grow much more slowly than those of Iceland, size alone cannot be the all-important factor in determining the age at which maturity will first be reached. During the cruise of the "Explorer" the condition of the reproductive organs, since spawning was being over, was unsuitable for the precise determination of maturities. From actual observations of the latter further on in the season SAEMUNDSSON places the age of first maturity between 4 and 6 years. All the evidence in this paper supports this finding. Probably the youngest spawners, aged 4, are mostly derived from the adjacent south and west coasts themselves.

As is the case in the North Sea female Haddock grow at a slightly faster rate than male. The data for female and male fish have not been separately treated here but an examination of the separate results for the sexes indicates that SAEMUNDSSON's estimate of the difference in growth rate — about 2 per cent. of the length of the fish at the age of five years— is correct. Female Haddock are always found in greater numbers than male in good feeding grounds inshore, and it is thus, probably, that they establish their slight advantage in length.

3. The 0-Group (First Year Haddock) at Iceland.

The product of the spawning season, the 0-group, probably remains in water which is moderately deep (10—120 metres) as is the case in the North Sea. There has been no cruise by a research vessel late in the year after the young fish have taken in large numbers to the bottom, hence precise data on this point are lacking. The following are the only existing records of the early bottom stages of Iceland Haddock:—

Year	Month	Locality	Vessel	No. of Specimens	Average Size
1925	August	Faxebay	"Dana"	145	$8^1/_2$ centimetres
—	—	Skialfandi Bay	—	3	6 —
1924	June	Faxebay	—	2	6 —
1908	July	—	"Thor"	1	$6^1/_2$ —

As is the case in the North Sea those fry experiencing the longest pelagic drift (in this case those reaching Skialfandi on the north coast) give rise to the initially smaller bottom stages. From the above figures the 0-group Haddock at Faxebay on the west coast are, in August, $2^1/_2$ cms. larger than those at Skialfandi Bay on the north coast.

The latter only attain, in August, the size already reached by the former in June (6 cms. approximately). Again, as in the North Sea, it is probable that a withdrawal into deeper water occurs in the first winter.

According to the "Explorer" 1925 records the Haddock, in the early summer of the second year, range over depths of from 25 to 215 metres, but occur mostly in from 25 to 100 metres, having moved into shoaler water as the result of the first inshore feeding migration.

4. Comparative Growth Rates of Iceland Haddock and those of some other Regions.

If the Haddock of Faroe be excluded those of Iceland exhibit a faster growth rate than those of any other region of the east Atlantic. Faroe Haddock, as the following table shows, very much resemble those of Iceland in growth rate, except that growth is a little faster in early years. Perhaps this is due to the lowering of the Iceland averages by east and north coast fish in the first few years of life. (The portion of the Faroe fishing banks exposed to the cold northerly current is much more restricted in size).

Table J. Comparison of Regional Growth Rates of Haddock.

Year	1	2	3	4	5	6	7	8	9	10
South-East North Sea	18.5	29.8	35.6	40.8	46.3	49.2	..	..	..	..
Deep Central North Sea	16.4	23.4	27.1	29.0	31.6	33.3	..	..	..	..
Iceland	16.5	30.6	39.7	47.9	55.1	60.4	64.0	68.8	72.0	75.5
Faroe	16.5	31.7	41.6	48.3	54.8	60.6	65.8	69.6	72.8	74.4

Even the best North Sea growth falls far below that for Faroe and Iceland. It is an open question what are the conditions favouring fast growth of Haddock. There is evidence to show that the fauna (part of which is available for food) is richest wherever different hydrographical conditions come into competition; in this respect Faroe and Iceland are, on the south-western aspect, exposed to the direct influence of the Atlantic Stream, and on the north-eastern to that of the cold polar current. In the North Sea and along the Norwegian coast, however, the influence of the Atlantic Stream is more indirect. The Haddock of the latter regions agree in having a slower rate of growth and a lesser number of sclerites on their scales than the Haddock of Faroe and Iceland. It is of great importance to endeavour to determine what exactly are the food species sought after by Iceland Haddock and to find the conditions suitable for these species. A beginning has been made with this work in so far as determining the nature and quantity of the food obtained by Haddock on the north, west and south coasts is concerned.

5. Food of Haddock at Iceland.

A. Ritchie, B. Sc., Technical Assistant, has been responsible for the working up of a series of five samples of stomachs taken from Haddock during the "Explorer" cruise in June 1925. The following are the details of his analysis:—

Table K. Details of Food of Iceland Haddock.
(June 1925.)

Serial No. of Trawl Haul	Part of Coast	Position	Date	Time	No. of Stomachs Examined	No. Empty	Species of Food Found	Average of Food per Stomach
739	North	66°02′ N 17°30′ W Skialfandi Bay MM 31 d.	15th	7—8 p.m.	14	1	Schizopods (sp.?) 100 % Partly digested	? (negligible)
775	—	65°43′ N 20°22′ W Skagestrand JJ 30 d.	18th	6.30—7 a.m.	43	31	Ophiopholis aculeata (91 %) Subsidiary:— Other Ophiuroid sp.) Parathemisto sp. Schizopod sp. Gobio sp. } 9 % Partly digested	0.5 cc.
798	North-West	66°32′ N 22°03′ W East of North Cape GG 32 d.	18th	12—12.15 p.m.	16	2	Ophiopholis aculeata (82 %) Subsidiary:— Ophiura albida 11 % Polychaeta { Nereis sp. / Nephthys sp. / Goniada sp. } 7 % Traces of:— Cardium sp. Leda sp. Hippolyte spinus	7.0 cc.
809	North-West	66°36′ N 23°23′ W West of North Cape FF 32 d.	20th	1—1.30 p.m.	11	1	Polychaetes 83 % (Terebellides stroemi) along with fewer Phyllodoce maculata Subsidiary:— Ophiura albida Ophiopholis aculeata } 17 % Traces of Chiton sp. and Echinus sp.	6.8 cc.
962	South	63°25′ N 19°25′ W Portland KK 25 b.	30th	7.30—8.30 p.m.	26	0	Ammodytes sp. 100 %. From 1—26 per stomach, partly digested Traces of Mactra sp. and Crangon Allmanni (Nematode worms present, up to 215 per stomach)	27.3 cc.

The food on the north and north-west coasts therefore consisted of brittle-stars, worms and schizopods and the average contents of these per stomach varied up to 7 cubic centimetres. On the south coast, by contrast, sand-eels were practically the only food sought, and the average volume of the contents was very high — 27 cc. (The volume of food was found by water displacement).

There seems to be little doubt that the sand-eel is very potent as a food of medium and large Haddock, for wherever the latter are found preying upon this food growth is very rapid. Apart from its superiority in sheer nutritive value over a brittle-star — worm diet, the volume available is several times that found on the north coast. Later in the season, however, the sand-eel does occur on the north coast and it is then, most likely, that the fastest growth of Haddock on that coast occurs.

Faroe Bank, where growth is even more rapid than at Iceland is, at the same time of the year, poor in available brittle-star — worm fauna and rich in sand-eel and the hermit crab *Eupagurus Bernhardus*, upon both of which the Cod and Haddock are found to be feeding freely. On the north-east side of Faroe, however, the hydrographic conditions are more akin to those of north Iceland, and the Haddock grow much more slowly than on the Bank, their food being restricted to the brittle-star — worm variety.

It is a notable fact that flatfish, among whose staple diet worms play an important part, appear to tend to reverse the order of growth rate as outlined above for Haddock and Cod. TÅNING (11) states that the average size of Plaice at Skialfandi exceeds that at Faxebay, age for age. Similarly the scales of Lemon Soles caught on Faroe Bank tend to show that these fish have actually a slower growth rate than those of the North Sea — quite the reverse of the case with Haddock and Cod.

Summary.

The study of the more intensive collections of material by research vessels in recent years makes possible a restatement, with amplification, of the known features of the biology of the Haddock at Iceland.

This region experiences at various seasons and on different portions of the coast a wide range of hydrographic conditions, which have an important effect on the welfare of the general fauna, including the Haddock. Two regions at least become differentiated — the north and east coasts exposed in the main to the colder Polar current, the south and west coasts to the warmer Atlantic Stream.

The available material was obtained from cruises of research vessels in 1903, 1904, 1905, 1908, 1909, 1924, 1925 and 1926. During the last three years more particular attention was devoted to the collection of Haddock material, and the results for recent years are therefore most reliable and extensive. The catches of commercial vessels were also sampled in the Aberdeen Market, this work beginning in 1922.

It is demonstrated that the commercial otter trawl, which is regarded as the standard instrument for taking samples of the stock, catches, in unit time, shots of Haddock which display remarkable qualitative and quantitative consistency. It is claimed that the life-history of a Haddock year brood can, by repeated sampling by the trawl, be followed with considerable accuracy.

The procedure followed is to make an age analysis of the catches by means of scale examination, and to reckon the success of a brood by the average numbers caught over the whole area per unit of time. The data are too scanty as yet for the estimation of the rate at which, under present fishing conditions, a brood is eliminated. The relative productivity of the various year broods is, however, discussed.

A scale of average frequencies is suggested as a means of estimating the relative productivity of the broods. A "normal" brood is for the present defined as one which, distributed while young to the south and west coasts, yields in unit time, during the first three years of life, average catches all over the region of approximately 2000 Haddock. An "abnormal" brood is, on the other hand, one which gives during the same period of life average catches much greater or less than 2000 in unit time; or alternatively it is one which is distributed while young to the north and east coasts. On the latter coasts there is a marked preponderance of years of poor productivity — only one brood in every two or three reaches these coasts in any appreciable numbers, and only one in five or six in great numbers (representing the body of the shoal). On the south and west coasts, which must be regarded as the normal habitat of young Haddock, the position is reversed. Only one brood in about every three is unproductive. For the whole Icelandic Plateau it may be estimated that abnormally productive broods are indicated, on one coast or another, once in every three years. Very unproductive broods occur with similar frequency.

Of the post-war broods those of 1919—1920 were of the rather unproductive type, those of 1921—1924 were either normally or more than normally productive (although those of 1921—1922 tended to be distributed towards the north coast) and that of 1925 was again rather unproductive.

The course of the Haddock fisheries during the period mentioned confirms these findings. Thus after the recuperative war period the catches in unit time were high, but, apparently owing to the comparative failure of the 1919—1920 broods, they dwindled for a period, which was prolonged by the northerly distribution of the 1921—1922 broods. However with the gradual return of these to the west and south and with the accession of the numerous and normally distributed 1923—1924 broods, the average catches again rose.

The Icelandic Haddock fishery reacts particularly sensitively to the periodicity in the type of productivity of the year broods, since the major portion of the commercial catches consists of immature fish (up to 4 or 5 years of age). The possible forecasting of the probable course of the fisheries therefore depends upon an accurate knowledge of the relative frequency of the newer broods and their location while young.

Owing to the congregation of the mature Haddock on the spawning grounds of the south and west coasts, at an average age of about 5 years, the differentiation of individual rates of growth for the different coasts is restricted to the adolescent stages. For the first five years or so of life the rate of growth is most rapid on the south coast, but diminishes towards the west, north and east in agreement with diminishing mean annual temperature. In the fifth summer the maximum difference in length between south and north coast fish is about 20 cms.

The resultant rate of growth for the whole region falls from $16^1/_2$ cms. in the first year to $5^1/_2$ in the 6th year. Thereafter up till the 10th year an average addition of only $3^1/_2$ cms. is made to the length. Haddock over ten years of age grow on the average by only $2^1/_2$ cms. per year.

The growth rate curve for the west coast approximates to that for the whole region. This is natural since on this coast there is considerable inte change (with year and season) with the north and south coasts. The oldest Haddock of all tend to move towards the west and north-west of the island. There is no evidence to show what the maximum age and size attainable by Haddock may be. The largest Haddock of which there is authentic record was at the time of capture 42 inches in length, and appeared from its scale zoning to be still growing lustily.

It is suggested that the limiting temperature for growth is about $4^1/_2°$ C. as it is with the advance along the north coast of water of this temperature that the Haddock shoals move. This coast is not normally populated by a new brood during its first year, but is more often so in the second summer, more rarely in the third. The north coast stock is composed of immature Haddock, there being no fish of over five years of age except a few backward adolescents and, in autumn, a few feeding immigrants.

Hvals Bak on the south-east and, with less constancy, Straumnes on the north-west coasts may be regarded as the points dividing the north and east conditions from those of the south and west. Early in life the locality is reached which will determine the growth rate for the first four or five years. Thus the establishment of the general growth rate of Icelandic Haddock must be based on the study of a number of broods. The history of the movements of these broods is to some extent determinable from the growth rates calculated from the width of the annual zones in their scales. Thus the 1904 and 1921 broods at least are shown to have been abnormally distributed to the north and east coasts in early life.

There is no apparent difference between the numbers of vertebrae in Haddock of Iceland and other regions. Icelandic Haddock, however, resemble those of Faroe and differ from those of all other regions in the characteristic number of annuli added each year to the scales. The latter are also characteristic in microscopic appearance, as there is not, except in the north and east, where the summer is short, that sharp differentiation between summer and winter growth which is usually apparent in scales of North Sea Haddock. On the south and west coasts of Iceland there is little difference (2—3° C.) between summer and winter temperature. On the north and east coasts the difference is much greater and in accordance with this the nature of the available food supply changes markedly with the advent of summer conditions. The sand-eel and capelin are then added to the sparser diet of annelids and brittle-stars previously available. In June it was found that the stomachs of south coast Haddock contained four times as much food as those of north coast fish. The importance of the sand-eel in promoting rapid growth is emphasised, and the tendency of the flatfish with different requirements of diet to grow better where Haddock and Cod do poorly, and vice versa, is noted.

Spawning occurs at Iceland at an age of at least one year older than is the case with North Sea Haddock.

The biology of the first year Haddock remains to be investigated in detail, since no cruise by a research vessel has taken place in autumn, when this group has taken to the bottom.

From the numbers of large Haddock available for the first time for scale study it was possible to further the reasoning previously advanced in explanation of the observed deficiency in calculated as compared with observed sizes. It is pointed out that the chief causes of this deficiency are the exposure (for more than a year) of the fastest growing young Haddock to a greater chance of capture; the nature of the scales selected for study (accounting for a deficiency in calculated size of from $^1/_2$ to $3^1/_2$ cms.); and now, from the study of nearly 6000 scales, the alteration, in later life, of the relative rate of growth of body and scale. The latter, growing relatively more quickly in later life, tends to throw out the calculated sizes for earlier years by a figure not exceeding $8^1/_2$ cms. A table of corrections is given in order to enable suitable corrections to be made to calculated sizes.

Bibliography.

(1) Bowman, A. The Qualitative Effect of Different Fishing Gears on the Stock of the Marketable Species. (Cons. Int., Rapp. Proc.-Verb. Vol. LII. Rep. of the Comm. appointed by the Council to consider the question of the closure of the Moray Firth to Trawling. Paper No. 11, 1928).

(2) Day, F. British Fishes. (London 1880—84).

(3) Heincke, Fr. Naturgeschichte des Herings. (Abhandl. d. Deutsch. See-Fischerei Vereins. II. 1898).

(4) Lea, Einar. Further Studies concerning the Methods of calculating the Growth of Herrings. (Cons. Internat., Publications de Circonstance, No. 66, 1913).

(5) Lee, Rosa M. An Investigation into the Methods of Growth Determination in Fishes. (Cons. Internat., Pub. de Circonstance, No. 63, 1912).

(6) — A Review of the Methods of Age and Growth Determination in Fishes by means of Scales. (Min. of Agr. and Fish., Fish. Invest., II., Vol. IV., No. 2, 1920).

(7) Saemundsson, Bjarni. Fiskirannsoknir, 1915—16, Andvari XLII, pp. 97—108; Fiskirannsoknir, 1917—18, Andvari XLIV, pp. 68—75; Fiskirannsoknir, 1919—20, Andvari XLVI, pp. 64—69.

(8) — On the Age and Growth of the Haddock (*Gadus aeglefinus*, L.) and the Whiting (*Gadus merlangus*, L.) in Icelandic Waters. (Medd. fra Komm. for Havund., Serie Fiskeri, Bd.VIII, 1921).

(9) Schmidt, Johs. The Distribution of the Pelagic Fry and the Spawning Regions of the Gadoids in the North Atlantic from Iceland to Spain. (Cons. Internat., Rapp. et Proc. Verb., Vol. X., 1902—07, No. 4).

(10) — Administrative Reports for 1924—25. (Report of the North-Western Area Committee for 1924 and 1925 in Rapp. et Proc. Verb., Vol. XXXIX. May 1925).

(11) Tåning, Å. Vedel. Contributions to the Life History of the Icelandic Plaice. (Cons. Internat., Rapp. et Proc. Verb., Vol. XXXIX, Report of the North-Western Area Comm. for 1924 and 1925. May 1926).

(12) Thompson, Harold. Problems in Haddock Biology, with special reference to the Validity and Utilisation of the Scale Theory. I. Preliminary Report. (Fish. Scot., Sci. Invest., 1922. No. V. May 1923).

(13) — Frequency and Distribution of the Age Classes in 1923. (Fish. Scot., Sci. Invest., 1924. No. 1. June 1924).

(14) — Preliminary Report on Iceland Haddock, from Danish Data referring to years 1903—1924. (Cons. Internat., Rapp. et Proc. Verb., Vol. XXXIX, Rep. of the North-Western Area Committee for 1924 and 1925. May 1926).

"Dana". Table a. Frequency Distribution by Size (in centim

	Station	Date	Area		Depth	Hours	5	..	..	..	..	10	..	..	..	..	15	..	..	..	..	20	.
West	*2443	1/8 25	GG 27 d	Faxebay	34 m.	15	..	..	2	14	45	17	4	..	..	..	..	1	..	..	6	2	1
	*2445	1-6/8 25	c	—	36 -	20	..	1	3	8	19	10	..	..	..	..	3	17	25	81	220	327	40
	*2446	7-8/8 25	d	—	35 -	4	..	2	2	7	9	2	..	..	..	..	..	..	..	1	1	4	
	*2442	30/7 25	d	—	35 -	1/2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
North	*2458	10-11/8 25	MM 31 d	Skialfandi	26 -	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	
	*2459	11/8 25	d	—	9 -	1/2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	*2460	11/8 25	d	—	68 -	1/2	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.

"Explorer".

	Haul No.	Date	Area		Depth	Hours	5	..	..	..	..	10	..	..	..	..	15	..	..	..	..	20	.
East	659	11/6 25	QQ 29a	..	139 m.	1/2	(Net torn)	..	..	..	..	..	..	..	..	..	1	..	1	1	1	..	..	.
	677	12/6 25	RR 29a	..	220 -	1/2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	*700	14/6 25	PP 31b	Langanaes	180 -	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	*709	—	OO 32d	..	160 -	1	..	..	..	..	..	..	1	1	1	9	10	8	2	3	3	.	
	*725	15/6 25	NN 31a	..	213 -	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	.
North	732	—	MM 31d	Skialfandi	18 -	1	(Net torn)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	739	—	—	—	37 -	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	.
	755	17/6 25	LL 31b	..	150 -	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	775	18/6 25	JJ 30d	Skagestrand	47 -	1/2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	776	—	JJ 31c	..	204 -	1/2	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	.
	798	—	GG 32d	..	63 -	1/4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	800	20/6 25	FF 32d	..	72 -	1/2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	809	—	—	..	81 -	1/3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	826	—	FF 31a	..	126 -	1/4	(Net torn)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
West	867	21/6 25	FF 28d	Faxebay	130 -	1/2	..	..	..	..	..	..	..	..	..	1	1	12	15	13	14	2	.
	883	24/6 25	GG 27d	—	55 -	1/2	..	..	..	..	..	..	..	..	..	..	..	3	11	8	9		
	891	—	—	—	35 -	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	.	
	892	—	GG 27c	—	30 -	1/2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
	901	—	GG 27d	—	36 -	1/2	..	..	..	..	..	..	..	..	..	..	..	8	8	18	18	1	
	*903	25/6 25	GG 27d	—	36 -	1	..	..	..	..	..	..	..	..	..	..	3	12	15	14	19	1	
	912	27/6 25	GG 26a	Reykjanes	90 -	1	..	..	..	..	..	..	1	2	14	56	169	311	339	273	128	5	
	921	26/6 25	FF 26b	—	148 -	1	..	..	..	..	..	..	..	..	1	1	7	16	8	4	3	.	
	928	—	GG 26c	—	170 -	1/2	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.	
South	936	27/6 25	HH 26c	..	114 -	1	..	..	..	..	..	..	..	..	..	..	1	5	6	12	8		
	937	—	JJ 25a	Westmann Is.	117 -	1	..	..	..	..	..	..	..	..	..	..	..	3	10	2	3		
	944	—	JJ 26d	—	65 -	1	..	..	..	..	..	..	..	1	1	8	19	90	135	211	209	15	
	951	—	—	—	65 -	1	..	..	..	..	..	..	..	1	..	2	13	60	146	299	362	36	
	952	30/6 25	JJ 25b	—	176 -	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..		
	961	—	KK 25a	Portland	184 -	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	962	—	KK 25b	—	45 -	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
	971	1/7 25	LL 25b	..	97 -	1	..	..	..	..	..	..	..	1	..	1	7	43	147	327	430	34	
	981	—	MM 26d	..	114 -	1	..	..	..	..	..	..	..	..	..	2	3	21	59	82	38	1	
	989	—	NN 26b	Ingolfs	63 -	1	..	..	..	..	..	..	..	..	..	2	2	21	81	182	200	14	
	998	—	NN 26a	—	24 -	1	..	..	..	..	..	..	..	..	..	..	3	13	59	141	260	17	
	999	2/7 25	OO 27d	Hørne	37 -	1	..	..	..	..	..	..	..	..	..	3	5	21	105	195	303	32	
	1008	—	PP 24a	—	39 -	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1025	—	QQ 24b	Hvals	173 -	1/4	(Net torn)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.

* 50′ Otter Trawl used.

Appendix.

ches made by the "Dana" and the "Explorer" in Icelandic Waters, in August and

..	..	30	..	..	..	..	35	..	..	..	..	40	..	..	..	..	45	..	..	..	..	50	..	..	..	..	55	..	..	..	..	60	..	..	..	..	65	..	..
..	1	4	2	9	6	17	16	6	2	2	..	2	..	..	..	..	..	2	..	1	1	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	33	99	186	423	141	416	291	151	38	24	14	5	3	6	10	13	26	27	31	19	7	8	1	..	..	1	2	..	..	1	..	..	..	..	..	..	..	..	..
..	1	..	2	5	3	7	12	3	4	3	2	..	..	..	..	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	39	33	36	66	98	138	201	187	163	168	137	111	59	44	32	26	33	19	19	13	7	3	2	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	3	1	1	1	1	1	..	..	2	..	..	..	2	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

..	..	30	..	..	..	..	35	..	..	..	..	40	..	..	..	..	45	..	..	..	..	50	..	..	..	..	55	..	..	..	..	60	..	..	..	..	65	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	13	18	44	49	65	63	82	71	73	73	53	46	36	32	24	38	32	31	14	14	9	7	3	6	1	..	2	..	1	1	..	..	..	..	..	..	..	..	..
12	33	65	104	196	230	253	278	278	226	187	138	107	62	83	68	76	70	52	30	20	7	7	2	6	..	1	1	1	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	1	1	3	3	18	11	30	41	35	41	23	16	18	15	22	29	28	33	25	20	15	8	3	5	..	1	1	1	..	..	..	..	..	1	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	1	..	..	..	1	..	1	2	..	..	..	..	3	..	..	..	1	1	..	1	..	..	..	..	1	..	..	..	1	1	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3	..	..	1	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	2	4	..	2	..	..	1	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
3	2	3	7	7	4	4	4	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	1	..	1	1	3	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	1	..	..	..	..	..	..	1	1	..	3	3	1	4	5	2	1	1	1	..	3	..	..	..	1	2	1	..	1	2	..	..	..	2	..
5	10	15	49	47	33	35	18	6	1	2	..	..	..	2	2	1	7	4	3	3	3	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	5	21	14	12	17	6	1	2	..	..	..	..	1	..	2	3	4	4	6	1	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
192	289	189	228	109	82	37	13	5	4	..	..	..	2	..	2	2	10	8	7	10	5	4	3	4	2	1	1	4	3	2	1	2	1	..	4	1	..	..	2
..	2	3	4	5	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	2	1	2	3	..	..	1	1	..	..	..	..	..	1	1	..	..	..	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	..	1	5	4	10	11	13	8	9	6	3	..	2	..	1	1	1	..	1	2	2	4	2	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..
8	8	14	38	50	62	62	75	45	29	14	7	1	1	..	..	..	1	3	1	..	2	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	1	2	11	21	44	52	97	101	136	129	119	90	43	31	11	11	12	7	9	17	16	18	27	12	14	5	5	9	3	3	6	1	1	..	2	..	..	1	..
..	1	..	..	..	2	2	5	3	4	1	..	1	..	..	..	..	1	..	..	2	2	3	3	2	..	..	1	..	1	1	..	..	..	..	1	1	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	1	..	2	..	4	9	7	7	4	8	7	1	1	..	2	..	1	..	..	2	2	3	3	2	..	3	2	2	3	1	2	1	..	..	1	..	..
1	..	1	..	5	3	6	12	13	14	12	16	8	4	5	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	4	7	10	22	46	44	68	78	82	44	31	19	14	10	10	5	13	10	14	14	8	6	17	6	2	3	1	..	..	..	1	1	..	..	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..

June 1925 respectively.

..	..	70	..	..	..	..	75	..	..	..	..	80	..	..	..	..	85	Total	♂	♀
..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	207	56	60
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4001	1786	1512
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	80	34	23
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1757	1069	688
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14	6	8
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..

.	.	70	..	..	..	..	75	..	..	..	..	80	..	..	..	..	85	Total	♂	♀
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	38	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	924	526	398
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2670	1668	1002
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	466	238	228
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..
.	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	4	1	3
.	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	17	6	11
.	..	..	..	1	..	..	..	..	..	..	..	1	1	..	..	..	..	11	4	7
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	73	11	4
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	72	22	14
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	7	8
.	1	..	1	..	..	..	1	..	1	..	..	2	..	..	..	..	..	42	23	19
.	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	337	142	107
.	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	208	52	57
.	1	1	..	2	3	2	1	1	..	..	2	..	..	..	..	1	..	2949	989	608
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	58	15	3
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	54	10	9
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1080	60	43
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2042	283	165
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	..	..
.	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1075	585	489
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1616	23	17
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	233	1	0
1	..	..	3	1	1	..	..	..	1	..	..	..	..	..	..	..	..	763	51	41
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	936	65	53
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1899	352	280
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	0

Table b. Age Analysis of the catches of Table a together with the details giving the growth curves in Graph 3 and part of the average 10 hour catches in Table E of the Text.

1925 Brood (0-Group).

Length (cms.)	West			North		
	Sta. 2443	- 2445	- 2446	- 2458	- 2459	- 2460
$5^1/_2$	..	1	..	..	..	2
6	..	..	2	..	..	1
$6^1/_2$	1	..	..	..	..	..
7	1	3	2	..	..	..
$7^1/_2$	5	4	2	..	..	..
8	9	4	5	..	..	..
$8^1/_2$	17	7	5	..	..	..
9	28	12	4	..	..	..
$9^1/_2$	9	9	..	..	..	..
10	8	..	2	..	..	..
$10^1/_2$	4	1	..	..	..	..
Total...	82	41	22	0	0	3
Total per 10 hours...	55	21	55	0	0	60
Resultant Total*)...	352			160		
Mean Size (cms.)	8.9	8.6	8.2	..	..	5.8
Resultant Size (cms.)	8.6			5.8		

"Dana", August

*) The actual resultant has been multiplied by 8 to bring up to 60′ trawl standard.

Length (cms.)	West				North			East					North					
	Sta. 2443	- 2445	- 2446	- 2442	- 2458	- 2459	- 2460	Haul 659	- 677	- 700	- 709	- 725	- 732	- 739	- 755	- 775	- 776	- 798
12	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..
15	..	3	..	..	..	..	..	..	..	..	9	1	..	..	..	..	..	..
16	1	17	..	..	..	..	..	1	..	..	10	..	..	..	..	..	1	..
17	..	25	..	..	..	..	..	1	..	..	8	..	..	..	..	..	..	..
18	..	81	1	..	..	..	..	1	..	..	2	..	..	..	..	..	..	..
19	6	220	1	..	..	..	..	..	..	..	3	..	..	1	..	..	..	..
20	2	327	4	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..
21	13	467	1	1	4	..	..	..	..	..	..	..	..	..	..	..	..	..
22	14	258	..	..	5	..	..	..	..	..	..	..	..	..	..	..	..	..
23	6	121	2	..	8	..	..	..	..	..	..	..	..	..	..	..	..	..
24	5	59	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	2	39	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	1	23	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total...	50	1640	13	1	17	0	0	4	0	0	38	1	0	1	0	0	1	0
Total per 10 hours	33	820	33	20	28	0	0	80	0	0	380	10	0	10	0	0	20	0
Resultant Total.											94						20	
Mean Size (cms.)	21.7	20.9	22.4	21.0	21.2	..	..	16.2	..	..	16.0	15.0	..	19.0	..	..	16.0	..
Result. Size (cms.)		21.0				21.2					16.0						17.5	

"Dana", August

West							South													
891 -	892 -	901 -	903 -	912 -	921 -	928 -	936 -	937 -	944 -	951 -	952 -	961 -	962 -	971 -	981 -	989 -	998 -	999 -	1008 -	1025 -
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	2	..	..	..	..	1	1	..	..	..	1	..	..	..	..	..	..
..	..	..	..	14	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	56	1	..	..	..	8	2	..	..	..	1	2	2	..	3	..	..
..	..	..	3	173	7	..	1	..	19	13	..	..	1	7	3	2	3	5	..	..
..	..	8	12	312	16	..	5	..	90	60	1	..	..	43	21	21	13	21	..	..
..	..	8	15	340	8	1	6	3	135	146	..	..	..	147	59	81	59	105	..	..
..	..	18	14	278	4	..	12	10	211	299	..	..	..	327	82	182	141	195	..	..
1	..	18	19	128	3	..	8	2	209	362	..	..	..	430	38	200	260	303	..	..
..	..	18	13	53	..	..	3	3	153	363	1	..	..	346	13	149	170	326	..	..
..	..	14	12	22	..	..	..	2	102	224	..	..	3	175	2	95	124	180	..	..
..	..	3	5	4	..	..	..	..	38	100	..	..	2	78	2	28	76	104	..	..
..	..	2	5	..	..	..	..	..	14	33	..	..	..	14	..	10	19	40	..	..
..	..	..	3	..	..	..	..	..	5	6	..	..	1	7	..	3	8	22	..	..
..	..	..	..	..	..	..	..	..	2	3	..	..	..	2	..	..	4	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	2	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	0	89	101	1383	40	1	35	20	988	1612	2	0	7	1578	222	773	885	1307	0	0
10	0	1780	1010	13830	400	20	350	200	9880	16120	20	0	70	15780	2220	7730	8850	13070	0	0
						4191														
20.0	..	20.0	20.0	17.9	17.3	18.0	18.9	19.4	19.7	20.2	19.0	..	21.9	20.2	18.8	20.1	20.6	20.6	..	..
		18.2												20.2						

"Explorer", June

Length (cms.)	West				North			East					North						
	Sta. 2443	- 2445	- 2446	- 2442	- 2458	- 2459	- 2460	Haul 659	- 677	- 700	- 709	- 725	- 732	- 739	- 755	- 775	- 776	- 798	800
22	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	
23	..	..	..	..	3	..	..	..	..	..	..	..	..	6	..	1	..	..	
24	..	..	..	..	1	..	..	..	..	..	..	..	3	22	..	..	..	..	
25	..	..	..	..	8	..	..	..	..	..	..	..	6	24	..	6	..	..	
26	..	..	1	..	14	..	..	..	..	..	..	..	6	16	..	4	..	..	
27	..	24	..	..	30	1	..	..	..	..	..	..	1	13	..	4	..	..	
28	..	20	..	..	44	..	..	..	..	..	..	..	..	3	..	3	..	..	
29	1	33	..	..	39	..	..	..	..	..	..	..	1	..	..	1	..	..	
30	4	99	..	..	25	..	..	..	..	..	..	..	..	..	..	..	..	..	
31	2	186	2	..	11	..	..	..	..	..	..	..	..	..	..	1	..	..	
32	9	423	5	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	
33	6	441	3	..	5	..	..	..	..	..	..	..	..	..	..	..	..	..	
34	17	416	7	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
35	16	291	12	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
36	6	151	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
37	2	38	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
38	2	24	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
39	..	14	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
40	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
41	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Total...	67	2164	42	2	187	1	0	0	0	0	0	0	17	85	0	20	0	0	0
Total per 10 hours	45	1082	105	40	312	20	0	0	0	0	0	0	170	850	0	400	0	0	0
Resultant Total.										0						341			
Mean Size (cms.)	34.0	33.2	34.6	34.5	28.3	27.0	..	..	..	..	..	..	25.5	25.2	..	26.4	..	..	
Result. Size (cms.)		33.4				28.3										25.6			

"Dana", August

West							South													
892 -	901 -	903 -	912 -	921 -	928 -	936 -	937 -	944 -	951 -	952 -	961 -	962 -	971 -	981 -	989 -	998 -	999 -	1008 -	1025 -
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	39	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..
..	..	1	107	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..
..	1	1	168	1	..	..	..	..	2	..	..	..	..	..	..	..	1	..	..
..	5	1	192	..	..	..	..	2	8	..	..	..	..	..	1	..	..	..	..
..	10	2	289	2	..	..	..	..	8	..	..	1	1	..	..	..	4	..	..
..	15	5	189	3	..	..	..	1	14	..	..	2	..	..	..	1	7	..	..
..	49	21	228	4	..	..	..	5	38	..	..	11	..	..	1	..	10	..	..
..	47	14	109	5	..	2	..	4	50	..	..	21	..	..	..	5	22	..	..
1	33	12	82	1	..	1	..	10	62	..	..	44	2	..	2	3	46	..	1
..	35	17	37	..	..	2	..	11	62	..	..	52	2	..	..	6	44	..	..
..	18	6	13	..	..	3	..	13	75	..	..	97	5	..	4	12	68	..	..
..	6	1	5	..	..	..	..	8	45	..	..	101	3	..	9	13	77	..	..
..	1	2	4	..	..	..	..	9	29	..	..	136	4	..	7	14	81	..	..
..	2	..	..	..	..	1	..	6	14	..	..	129	1	..	7	12	42	..	..
..	..	..	..	..	..	1	..	3	7	..	..	119	..	..	4	16	31	..	..
..	..	..	..	..	..	..	..	..	1	..	..	90	1	..	8	8	17	..	..
..	..	..	..	..	..	..	..	1	1	..	..	43	..	..	7	4	11	..	..
..	..	..	..	..	..	..	..	..	..	..	..	30	..	..	1	5	7	..	..
..	..	..	..	..	..	..	..	..	..	..	..	9	..	..	..	..	4	..	..
..	..	..	..	..	..	..	..	..	..	..	..	10	..	..	2	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	7	..	..	..	..	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..
1	222	83	1482	18	0	10	0	74	420	0	0	904	19	0	53	99	473	0	1
10	4440	830	14820	180	0	100	0	740	4200	0	0	9040	190	0	530	990	4730	0	40

1970

33.0	32.3	32.3	29.2	30.1	..	34.7	..	34.9	33.7	..	..	37.4	35.3	..	37.9	37.1	35.8	..	33.0
30.0						36.1													

"Explorer", June

Length (cms.)	West				North			East					North						
	Sta. 2443	- 2445	- 2446	- 2442	- 2458	- 2459	- 2460	Haul 659	- 677	- 700	- 709	- 725	- 732	- 739	- 755	- 775	- 776	- 798	
28	..	..	..	..	..	..	..	..	..	..	..	..	4	9	..	..	..	..	
29	..	..	..	..	..	..	..	..	..	..	..	..	12	32	..	..	..	..	
30	..	..	..	..	8	..	..	..	..	..	..	..	18	65	..	1	..	..	
31	..	..	..	..	25	..	..	..	..	..	..	..	44	104	..	2	..	..	
32	..	..	..	..	60	..	..	..	..	..	..	..	49	196	..	3	..	..	
33	..	..	..	..	93	..	..	..	..	..	..	..	66	230	..	18	..	..	
34	..	..	..	..	138	..	..	..	..	..	..	..	64	253	..	11	..	..	
35	..	..	..	..	201	..	..	..	..	..	..	..	81	276	..	30	..	..	
36	..	..	..	..	187	3	..	..	..	..	..	..	71	276	..	40	..	..	
37	..	..	..	..	163	1	..	..	..	..	..	..	73	220	..	35	..	..	
38	..	..	..	..	168	1	..	..	..	..	..	..	72	174	..	41	..	..	
39	..	..	..	..	139	1	..	..	..	..	..	..	49	119	..	22	..	..	
40	..	2	..	..	111	1	..	..	..	..	..	..	35	72	..	12	..	..	
41	..	2	..	..	53	1	..	..	..	..	..	..	22	27	..	8	..	..	
42	..	6	..	..	33	..	..	..	..	..	..	..	9	12	..	4	..	..	
43	..	10	..	..	12	..	..	..	..	..	..	..	3	3	..	2	..	..	
44	..	14	..	..	2	1	..	..	..	..	..	..	2	1	..	2	..	..	
45	..	27	1	..	2	..	..	..	..	..	..	..	3	..	..	..	..	..	
46	2	27	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	
47	..	32	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
48	1	19	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
49	1	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
50	2	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
51	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
57	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
58	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
59	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
60	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
61	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
62	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
Total...	7	155	3	0	1396	9	0	0	0	0	0	0	677	2069	0	231	0	0	
Total per 10 hours	5	78	8	0	2327	180	0	0	0	0	0	0	6770	20690	0	4620	0	0	1
Resultant Total.										0						5794			
Mean Size (cms.)	48.6	46.0	46.3	..	36.6	38.6	..	..	..	..	..	..	35.5	35.0	..	36.8	..	..	3
Result. Size (cms.)		46.2				36.7										35.4			

"Dana", August

West							South													
891 -	892 -	901 -	903 -	912 -	921 -	928 -	936 -	937 -	944 -	951 -	952 -	961 -	962 -	971 -	981 -	989 -	998 -	999 -	1008 -	1025
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..	1	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..
.	1	..	..	2	..	..	..	.	..	..	..	..	..	..	..	..	..	3	..	..
..	..	2	1	..	..	..	..	..	..	..	..	..	1	..	..	..	1	2	..	..
..	3	2	..	2	..	..	..	..	1	..	..	..	2	..	..	..	..	6	..	..
..	3	1	2	2	..	..	..	..	1	..	..	..	1	..	..	..	..	5	..	..
..	1	7	3	7	..	..	1	..	1	1	..	..	7	1	..	..	..	12	..	..
.	4	4	4	8	..	..	1	..	..	3	..	..	5	..	..	1	..	10	..	..
.	5	3	4	7	..	..	..	..	1	1	..	..	8	..	..	..	..	14	..	..
..	2	3	6	10	..	..	..	..	2	..	..	..	16	2	..	..	..	14	..	..
.	1	3	1	5	..	..	..	..	2	2	..	..	16	2	..	2	..	7	..	..
.	1	1	1	4	..	..	..	..	4	1	..	..	18	3	1	2	1	6	..	..
.	1	..	..	3	..	..	1	..	2	..	..	..	24	3	..	3	..	16	..	..
..	..	..	..	4	..	..	..	..	1	1	..	..	9	2	..	3	1	4	..	..
..	2	..	..	2	..	..	..	..	1	1	..	..	13	..	..	2	..	2	..	..
..	..	..	..	1	..	..	..	..	1	..	..	..	5	..	..	2	..	3	..	..
..	..	..	..	..	..	..	1	..	..	..	..	..	4	1	..	1	..	1	..	..
..	..	..	..	1	..	..	..	..	1	..	..	..	6	..	..	2	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	2	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	.	..	..	..	..	..	1	..	..	..	..	..	..
.	25	26	22	58	0	0	4	0	18	10	0	0	136	17	1	26	3	112	0	0
9	250	520	220	580	0	0	40	0	180	100	0	0	1360	170	10	260	30	1120	0	0
							200													
..	46.2	46.0	46.6	47.8	..	..	49.2	..	49.5	48.3	..	..	50.0	51.7	50.0	53.9	48.0	47.1	..	..
	46.8																			
													49.3							

"Explorer", June

Length (cms.)	West				North			East					North					
	Sta. 2343	- 2445	- 2446	- 2442	- 2458	- 2459	- 2460	Haul 659	- 677	- 700	- 709	- 725	- 732	- 739	- 755	- 775	- 776	- 798
35	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..
36	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	1	..	..
37	..	..	..	..	..	..	..	..	..	..	..	..	..	6	..	..	..	..
38	..	..	..	..	..	..	..	..	..	..	..	..	2	13	..	..	..	..
39	..	..	..	..	..	..	..	..	..	..	..	..	5	19	..	1	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	11	35	..	5	..	..
41	..	..	..	..	6	..	..	..	..	..	..	..	14	34	..	10	..	..
42	..	..	..	..	11	..	..	..	..	..	..	..	25	70	..	11	..	..
43	..	..	..	..	20	..	..	..	..	..	..	..	25	66	..	20	..	..
44	..	..	..	..	24	1	..	..	..	..	..	..	37	75	..	28	..	..
45	..	..	..	..	31	..	..	..	..	..	..	..	30	70	..	28	..	..
46	..	..	..	..	18	..	..	..	..	..	..	..	31	52	..	33	..	..
47	..	..	..	..	20	..	..	..	..	..	..	..	14	29	..	25	..	..
48	..	..	..	..	14	2	..	..	..	..	..	..	14	20	..	20	..	..
49	..	..	..	..	7	1	..	..	..	..	..	..	9	6	..	14	..	..
50	1	..	..	..	4	..	..	..	..	..	..	..	8	5	..	7	..	..
51	..	..	..	..	2	..	..	..	..	..	..	..	3	2	..	3	..	1
52	..	..	..	..	1	..	..	..	..	..	..	..	4	3	..	4	..	1
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
54	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
57	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
58	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
59	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
61	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
62	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
64	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
65	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
66	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
67	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
68	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total...	1	4	0	0	159	4	0	0	0	0	0	0	232	509	0	212	0	3
Total per 10 hours	1	2	0	0	265	80	0	0	0	0	0	0	2320	5090	0	4240	0	120
Resultant Total.										0						1975		
Mean Size (cms.)	50.0	55.5	..	..	45.2	47.2	..	..	..	..	..	..	44.5	43.5	..	45.5	..	52.0
Result. Size (cms.)		54.4				45.7										44.7		

"Dana", August

West							South													
891 -	892 -	901 -	903 -	912 -	921 -	928 -	936 -	937 -	944 -	951 -	952 -	961 -	962 -	971 -	981 -	989 -	998 -	999 -	1008 -	1025 -
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	..	..	1	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
.	..	..	..	3	..	..	..	..	..	..	..	..	2	..	..	1	..	..	..	..
..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	..	1	2	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..
..	..	..	..	1	..	..	..	..	..	..	..	..	4	..	..	..	..	1	..	..
1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..
2	4	0	1	14	0	0	0	0	0	0	0	0	16	0	0	5	0	5	0	0
20	40	0	10	140	0	0	0	0	0	0	0	0	160	0	0	50	0	50	0	0

27

59.0	59.8	..	58.0	58.3	..	..	..	..	..	..	..	..	54.7	..	..	62.2	..	52.6	..	..

58.6 | 55.8

"Explorer", June

Table b (continued).

1920 Brood (5-Group).

(All Nil Hauls omitted from this point).

Length (cms.)	Sta. 2458	North			West and South									
		Haul 732	- 739	- 775	- 800	- 809	- 892	- 912	- 936	- 962	- 971	- 989	- 999	- 1025
47	..	..	1	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	1	1	..	..	..	..	..	..	..	..	..	..
50	..	..	2	1	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	2	3	1	..	..	..	..	..	..	..	..	..	..
53	3	1	..	..	..	..	1	..	..	..	..	..	..	..
54	..	..	..	1	..	..	..	..	..	..	..	..	..	..
55	..	2	1	..	..	..	..	..	1	..	..	..	..	..
56	..	..	1	..	..	..	..	..	..	1	..	..	..	..
57	..	1	..	..	..	..	1	..	..	1	..	..	..	..
58	..	1	..	..	..	..	..	..	..	1	..	..	..	..
59	..	..	..	..	..	..	1	..	..	2	..	..	..	..
60	..	..	..	..	..	..	..	1	..	1	..	..	1	..
61	..	..	..	..	1	1	..	..	..	..	..	..	..	1
62	..	..	..	..	..	..	1	..	..	..	..	1	..	..
63	..	..	..	..	..	..	..	1	..	1	..	..	..	..
64	..	..	..	..	..	..	..	1	..	..	1	..	..	..
65	..	..	..	..	..	..	..	..	..	..	..	..	..	..
66	..	..	..	..	..	..	2	..	..	..	..	..	..	..
67	..	..	..	..	..	..	..	..	..	..	..	..	..	..
68	..	..	..	..	..	..	..	..	..	..	..	..	..	..
69	..	..	..	..	..	..	..	..	..	..	..	..	..	..
70	..	..	..	..	..	..	..	..	..	..	..	..	..	..
71	..	..	..	..	..	..	1	..	..	..	..	2	..	..
72	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Total...	3	7	9	4	1	1	7	3	1	7	1	4	1	1
Total per 10 hours	5	70	90	80	20	30	70	30	10	70	10	40	10	40
Resultant per 10 hrs.			48						19					
Mean Size (cms.) ..	52.0	54.6	51.4	51.2	61.0	61.0	62.0	62.3	55.0	58.9	64.0	69.0	60.0	61.0
Resultant Size (cms.)	52.0		52.3						61.7					
	"Dana", August	"Explorer", June												

Table b (continued).

1919 Brood (6-Group).

Further differentiation of the North coast from the South and West ceases to be possible. In all only 5 positive hauls of this brood were made:—

Haul 775.	1 specimen,	62 cms. long.	North Coast
— 800.	1 —	66 — —	— —
— 809.	1 —	66 — —	— —
— 912.	1 —	63 — —	West —
— 962.	2 specimens,	57 and 63 cms. long.	South

Resultant Mean Size = **63.7** cms.

— Total per 10 hours = **3**

1918 Brood (7-Group).

5 positive hauls.

Haul 892.	1 specimen,	69 cms. long.	West Coast
— 912.	3 specimens,	67, 72 and 73 cms. long.	— —
— 962.	2 —	61 and 66 cms. long.	South —
— 989.	2 —	73 and 77 — —	— —
— 999.	1 specimen,	63 cms. long.	— —

Resultant Mean Size = **69.0** cms.

— Total per 10 hours = **3**

1917 Brood (8-Group).

9 positive hauls.

Haul 798.	1 specimen,	77 cms. long.	North Coast
— 800.	3 specimens,	65, 75 and 75 cms. long.	— —
— 883.	1 specimen,	68 cms. long.	West —
— 903.	1 —	77 — —	— —
— 912.	5 specimens,	67, 73, 74, 76 and 79 cms. long.	West Coast
— 936.	2 —	66 and 68 cms. long.	South Coast
— 962.	1 specimen,	67 cms. long.	— —
— 971.	1 —	68 — —	— —
— 989.	1 —	71 — —	— —

Resultant Mean Size = **72.6** cms.

— Total per 10 hours = **8**

1916 Brood (9-Group).

5 positive hauls.

Haul 809.	1 specimen,	80 cms. long.	North Coast
— 867.	1 —	65 — —	West —
— 892.	3 specimens,	75, 77 and 80 cms. long.	— —
— 912.	2 —	72 and 73 cms. long.	— —
— 936.	1 specimen,	69 cms. long.	South —

Resultant Mean Size = **73.5** cms.

— Total per 10 hours = **4**

Table b (continued).

1915 Brood (10-Group).

5 positive hauls.

Haul 809. 1 specimen, 72 cms. long.
— 867. 1 — 68 — —
— 892. 1 — 80 — — Locations as for 1916 Brood.
— 912. 3 specimens, 69, 70 and 75 cms. long.
— 936. 1 specimen, 71 cms. long.

Resultant Mean Size = **71.5** cms.

— Total per 10 hours = **3**

1914 Brood (11-Group).

3 positive hauls.

Haul 800. 1 specimen, 75 cms. long. North Coast
— 809. 1 — 81 — — — —
— 912. 3 specimens, 74, 79 and 84 cms. long. West —

Resultant Mean Size = **78.5** cms.

— Total per 10 hours = **3**

Table c. Resultant Mean Sizes of Age Groups, month by month, found from all the available samples, and plotted in Graph 2. (Sizes in centimetres).

Year		South	West	North	East	Year	South	West	North	East	Year	All Coasts	Year	All Coasts
	Apr.	..	..	..	..		54.4	..	..	..		67.7		..
	May	..	..	..	..		57.5	..	..	..		71.0		..
	June	..	..	..	..		58.6	50.7	44.7	40.5		70.7 and 72.6		..
	July	..	6.2	*2.5	..		..	51.4	45.2	..		71.5		81.0
	Aug.	..	8.6	5.8	..		56.0	53.7	45.7	46.7		73.9		82.0
I	Sept.	..	..	..	..	V	..	..	..	..	IX	71.5	XIII	..
	Oct.	..	..	..	..		..	..	..	..		..		..
	Nov.	..	..	..	..		..	56.0	..	..		71.7		..
	Dec.	..	..	..	..		..	55.6	..	48.9		71.3		..
	Jan.	..	..	..	..		58.0	..	..	..		..		..
	Feb.	..	..	..	..		..	57.7	..	..		71.3		..
	Mar.	..	..	..	..		54.0f	..	..	..		..		..
	Apr.	..	..	..	..		59.0		..	..		69.8		..
	May	17.4	..	..	14.5		59.7		..	..		75.3		..
	June	20.2	18.2	17.5	16.0		59.1 and 61.7		52.3	..		75.9 and 73.5		..
	July	..	19.5	19.4	16.1		††51.7		..	..		73.0		..
II	Aug.	..	21.0		17.0	VI	56.8		52.8	..	X	76.8	XIV	83.0
	Sept.	..	..	..	..		60.0		..	..		74.0		..
	Oct.	..	..	..	..		..		..	..		..		..
	Nov.	30.3	..	..	..		61.1		..	..		71.5		..
	Dec.	31.2	..	..	..		58.4		..	..		75.1		..
	Jan.-Mar.	..	..	..	..		58.7		..	..		78.7		..
	Apr.	..	..	..	..		60.4		..	..		73.4		..
	May	35.0	..	..	..		62.8		..	..		78.2		..
	June	36.1	30.2	25.6	..		63.8		..	..		76.3 and 71.5		..
	July	..	33.0	26.5	..		61.1		55.2	..		75.9		85.5
III	Aug.	..	35.7	28.3	25.4	VII	62.9		..	..	XI	77.4	XV	
	Sept.	..	..	..	..		61.5		..	..		78.5		..
	Oct.	..	..	..	..		..		..	..		..		..
	Nov.	45.4	42.3	..	..		64.6		..	..		73.9		..
	Dec.		42.2	..	..		61.7		..	..		73.8		..
	Jan.-Mar.	..	..	..	..		61.4		..	..		75.8		..
	Apr.	46.9	..	..	..		62.5		..	..		75.6		..
	May	48.8	..	..	..		69.0		..	..		76.0		..
	June	49.3	†42.1 46.8	35.4	..		67.5 and 69.0		..	..		78.5		..
	July	..	†43.3	35.9	..		67.7		..	..		79.7		..
	Aug.	..	†41.8	36.7	36.0		69.4		..	..		..		..
IV			46.2			VIII					XII		XVI	
	Sept.	..	..	..	..		64.0		..	..		..		..
	Oct.	..	..	..	..		..		..	..		..		..
	Nov.	54.8	†49.8 53.4	..	..		65.9		..	..		76.5		..
	Dec.	..	..	..	42.0		70.3		..	..		80.0		..
	Jan.-Mar.	..	53.3	..	..		67.4		..	..		76.0		..

*) Estimated by Saemundsson (8). †) Immigrants from North-West? ††) 1904 brood immigrants.
f = few fish.

Table d. Showing the Variation in sizes calculated from the Scales of H

I. Calculated Sizes from Hadd

North Coast of Iceland (Skialfandi Bay). De

Age of Haddock providing Scales	Sex	First Year			Second Y	
		Number of Specimens	Range of Calculaled Sizes	Mean	Number of Specimens	Range Calculat Sizes
Second Year	♂	1	18	18.0	1	..
	♀	..	..	..	..	..
Third Year	♂	24	13 to 16	14.4	24	21 to
	♀	9	13 - 17	15.1	9	23 -
	Both	33	13 - 17	15.1*	33	21 -
Fourth Year	♂	564	9 - 19	15.1	564	19 -
	♀	354	10 - 21	14.4	354	19 -
	Both	918	9 - 21	14.8	918	19 -
Fifth Year	♂	322	10 - 19	13.7	322	19 -
	♀	158	10 - 18	13.2	158	18 -
	Both	480	10 - 19	13.5	480	18 -
Sixth Year	♂	7	12 - 16	15.1	7	22 -
	♀	1	15	15.0	1	26
	Both	8	12 - 16	15.1	8	22 -

* Actual mean figures 14.6, 24.5 and 24.7 but corrected to allow for selection.

II. Calculated Sizes from Hadd

South Coast of Iceland (Portland). Depth 45 metres. 30th June 1925.

Age of Haddock providing Scales	Sex	First Year			Second Y	
		Number of Specimens	Range of Calculated Sizes	Mean	Number of Specimens	Range Calculat Sizes
Second Year	♂	1	17	17.0	4	22 to
	♀	1	19	19.0	2	22 -
	Both	2	17 to 19	17.2*	6	22 -
Third Year	♂	483	10 - 20	13.9	483	25 -
	♀	414	11 - 20	14.7	414	26 -
	Both	897	10 - 20	14.3	897	25 -
Fourth Year	♂	80	9 - 19	14.7	80	21 -
	♀	57	9 - 20	14.5	57	23 -
	Both	137	9 - 20	14.6	137	21 -
Fifth Year	♂	10	10 - 17	13.6	10	24 -
	♀	6	10 - 15	12.6	6	24 -
	Both	16	10 - 17	13.2	16	24 -
Sixth Year	♂	5	12 - 16	14.0	5	25 -
	♀	2	15	15.0	2	25 -
	Both	7	12 - 16	14.3	7	25 -

* Actual Means 18.0 and 22.7, but corrected to allow for selection.

t Ages and on different coasts of Iceland (part of data going to form Table D in text).

Haul 739, F. R. S. "Explorer".

925. 1440 fish out of Total Catch of 2670 were scaled.

itimetres at the end of

hird Year		Fourth Year			Fifth Year			Sixth Year		
Range of Calculated Sizes	Mean	Number of Specimens	Range of Calculated Sizes	Mean	Number of Specimens	Range of Calculated Sizes	Mean	Number of Specimens	Range of Calculated Rize	Mean
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
22 to 28	24.6	..	..	..	..	..	..	..	..	..
23 - 27	24.9	..	..	..	..	..	..	..	..	..
22 - 28	25.2*	..	..	..	..	..	..	..	..	..
- 43	37.1	No additional growth.								
- 44	33.1									
- 44	35.6									
- 43	34.8	322	35 to 52	43.8	No additional growth.					
- 42	34.1	158	37 - 52	42.8						
- 43	34.6	480	35 - 52	43.5						
- 41	35.0	7	39 - 49	45.5	7	47 to 55	51.0	No additional growth.		
	38.0	1	49	49.0	1	56	56.0			
- 41	35.4	8	39 - 49	46.0	8	47 - 56	51.6			

Haul 962, F. R. S. "Explorer".

n of 1074 scaled. Of these 4 older than the sixth year are omitted here.

metres at the end of

ird Year		Fourth Year			Fifth Year			Sixth Year		
Range of Calculated Sizes	Mean	Number of Specimens	Range of Calculated Sizes	Mean	Number of Specimens	Range of Calculated Sizes	Mean	Number of Specimens	Range of Calculated Sizes	Mean
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
9 to 44	37.2	..	..	..	..	..	..	..	..	..
3 - 46	37.4	..	..	..	..	..	..	..	..	..
9 - 46	37.3	..	..	..	..	..	..	..	..	..
3 - 51	44.1	80	36 to 56	47.9	..	..	..	..	..	..
5 - 50	45.0	57	43 - 57	51.1	..	..	..	..	..	..
3 - 51	44.5	137	36 - 57	49.2	..	..	..	..	..	..
5 - 44	40.2	10	44 - 56	51.1	10	47 to 59	53.0	..	..	..
5 - 47	41.3	6	49 - 58	55.5	6	53 - 59	57.6	..	..	..
5 - 47	41.3	16	44 - 58	52.8	16	47 - 59	54.7	..	..	..
5 - 41	38.2	5	47 - 52	49.0	5	54 - 62	57.6	5	56 to 63	59.0
7	37.0	2	48	48.0	2	56	56.0	2	58 - 59	58.5
5 - 41	37.9	7	47 - 52	48.7	7	54 - 62	57.1	7	56 - 63	58.8

Table e. Showing the fall in the average calculated size for the first year
Calculated Sizes of 12 months old Hadd

From Haddock in	Locality	Depth (metres)	No. of Specimens	Range of Calculated Sizes	Mean Size	Locality	Depth (metres)	No. of Specimens	Range Calculated Si
Second Year	OO27d	104	40	15 to 21	15.0	GG27d	36	24	11 to
	NN26a	26	60	12 - 22	15.9	—	—	44	14 -
	JJ26d	65	6	19 - 21	14.2	GG26a	90	9	14 -
	KK25b	45	2	17 - 19	17.2	—	—	100	11 -
	LL25b	97	54	12 - 18	15.7	FF28d	130	3	15 -
	JJ26d	65	66	12 - 22	16.2	GG27d	55	3	15 -
	NN26	..	35	14 - 22	17.3	..	..	..	..
	LL26	..	31	11 - 19	14.3	..	..	..	..
	NN26	..	60	10 - 23	13.5	..	..	..	..
Totals...	..	..	354	10 - 23	15.4	..	..	183	11 -
Third Year	JJ26d	65	432	9 - 18	13.6	GG27d	35	11	12 -
	KK25b	45	897	10 - 20	14.3	— c	30	1	..
	LL25b	97	19	12 - 18	13.9	— d	36	195	10 -
	NN26b	63	52	10 - 18	14.4	— c	37	21	13 -
	HH26c	114	10	12 - 16	14.8	— d	36	67	11 -
	JJ26d	65	73	11 - 18	14.4	GG26a	90	2	12 -
	OO27d	104	471	11 - 20	14.4	—	—	209	10 -
	NN26a	26	99	11 - 20	14.7	GG26b	148	15	10 -
	NN26	..	44	..	14.0	FF28d	130	11	12 -
	LL26	..	19	11 - 18	14.0	GG27d	55	35	11 -
Totals...	..	..	2116	9 - 20	14.2	..	..	567	10 -
Fourth Year	JJ26d	65	10	11 - 19	13.5	GG27c	30	25	12 -
	KK25b	45	137	9 - 20	14.6	— d	36	25	10 -
	LL25b	97	17	10 - 21	13.9	— c	37	7	11 -
	NN26b	63	25	10 - 19	14.6	— d	36	17	11 -
	HH26c	114	3	15 - 19	17.0	GG26a	90	58	11 -
	JJ26d	65	18	11 - 18	14.4	FF32d	72	3	12 -
	MM26d	..	1	10	10.0	—	81	4	15 -
	OO27d	104	111	11 - 19	14.2	FF28d	130	2	12 -
	NN26a	26	3	10 - 15	13.0	GG27d	55	0	..
	NN26	..	20	..	13.0	—	36	22	11 -
	LL26	..	4	10 - 13	11.0	..	..	..	..
Totals...	..	..	349	9 - 21	14.3	..	..	163	10 -
Fifth Year	KK25b	45	16	10 - 17	13.2	GG27d	35	2	10 -
	NN26b	63	5	13 - 14	13.6	— c	30	4	13 -
	OO27d	104	5	14 - 16	15.0	— d	36	1	12
	NN26	..	8	..	13.0	GG26a	90	12	10 -
	LL26	..	1	..	14.0	GG27a	..	92*	..
	..	..	..	..	..	FF32d	72	6	12 -
	..	..	..	..	..	—	81	2	12 -
Totals...	..	..	35	10 - 17	13.5	..	..	126	10 -

South West

* 1904 Brood.

r and older Haddock are used (part of the data going to form Table D in text).
es of Older Fish. (Sizes in centimetres).

Depth (metres)	No. of Specimens	Range of Calculated Sizes	Mean Size	Locality	Depth (metres)	No. of Specimens	Range of Calculated Sizes	Mean Size	Resultant Size
37	1	..	18.0	..	..	..	..	..	..
32	26	..	16.1	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	27	..	16.1	..	..	..	..	..	**15.6** cms.
18	16	12 to 17	14.6	PP31	..	1	..	14.0	..
37	33	13 - 17	15.1	QQ28	..	15	..	14.8	..
47	20	12 - 18	13.9	..	..	..	..	..	..
32	184	..	14.6	..	..	..	..	..	..
..	15	10 - 18	13.9	..	..	..	..	..	..
..	2	..	14.5	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	270	10 - 20	14.6	..	..	16	..	14.8	**14.2** cms.
18	686	11 - 20	14.2	PP31	..	2	..	12.0	..
37	918	9 - 21	14.8	QQ28	..	29	..	13.4	..
47	229	11 - 19	14.2	..	..	..	..	..	..
32	190	..	13.0	..	..	..	..	..	..
..	5	9 - 16	13.2	..	..	..	..	..	..
..	2	..	13.0	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	2030	9 - 21	14.3	..	..	31	..	13.3	**14.4** cms.
..	24	10 - 17	12.6	PP31	..	69	9 to 18	12.6	..
..	11	10 - 14	12.4	..	..	..	..	..	..
18	100	10 - 18	13.5	..	..	..	..	..	..
37	480	10 - 19	13.5	..	..	..	..	..	..
47	212	10 - 18	13.4	..	..	..	..	..	..
63	3	11 - 12	11.7	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..
..	830	10 - 19	13.4	..	..	69	9 to 18	12.6	**13.2** cms.
	North					East			

PRELIMINARY SURVEY OF THE RESULTS OF QUANTITATIVE BOTTOM INVESTIGATIONS IN ICELAND AND FAROE WATERS, 1926—1927

BY

R. SPÄRCK
(Zoological Museum, Copenhagen)

CONTENTS

	Page
I. Introduction	3
II. Invertebrate Bottom Fauna of the Faroes	4
III. Communities of the Bottom Fauna in Icelandic waters, especially in Faxe Bay	10
IV. Summary of Results	15
Literature	16
Tables	17

I.

Introduction.

During the cruises of the marine research vessel "Dana" to the Faroes and Iceland in 1926—1927, quantitative investigations of the invertebrate bottom fauna were made in addition to the other fishery-biological work. By far the greater part of the bottom samples were taken with Dr. Petersen's 0.2 sq. m. bottom sampler. This apparatus, it is true, does not give fully quantitative results on hard bottom, as the amount of material brought up varies somewhat in the different samples, and the container does not fill completely on the harder kinds of ground. The bottom sampler constructed by Martin Knudsen (1927), which will dig down into a hard, fine sandy floor and bring up samples of uniform volume, was also tried in the course of these investigations. But on a bottom consisting of sand mixed with a large proportion of gravel, stones and shells, this implement likewise failed to give entirely satisfactory results. But though the samples were not all completely accurate in quantitative respects, we nevertheless find, within the separate areas, sufficient agreement in the contents of the samples from one station to another, so that we may undoubtedly regard them as presenting an entirely correct view of the bottom fauna in its main features, both in qualitative and quantitative respects.

At the commencement of the investigations, at the Faroes, in 1926, the present writer was on board; the later samples were taken by Magister Å. V. Tåning and Magister Anton Bruun. The samples taken in 1926 were practically all dealt with on board, the material being sorted, preliminary determinations made, and the items counted and weighed. Of the samples from 1927 on the other hand, a great number were examined and weighed later, in Copenhagen, this work being carried out by Frk. stud. mag. Ellen Nielsen. A revision of the entire material has since been made, and in this I have received most valuable assistance from my colleagues at the Zoological Museum in Copenhagen, especially Magister Hj. Ditlevsen, who has determined a number of annelids, Cand. mag. K. Stephensen, who has dealt with crustaceans, and Dr. Th. Mortensen and Magister I. Lieberkind, who have helped with the echinoderms. Some of the annelids in the Icelandic samples from 1926 were determined by Hr. Fiskerikonsulent Bj. Sæmundsson, of Reykjavik. To all, who have thus assisted in the procuring and classification of the material I wish to express my hearty thanks, as also to the Leader of the fishery investigations in Iceland and Faroe waters, Professor, Dr. Johs. Schmidt, for entrusting this material to my care, and for the interest he has taken in the work. The material itself was subsequently deposited in the Zoological Museum in Copenhagen, where it is now preserved. Quantities of the larger and commoner forms, however, such as *Macoma calcarea*, *Modiola modiolus*, *Cyprina islandica*, were in several cases thrown away after the weights have been noted.

II.

Invertebrate Bottom Fauna of the Faroes.

The samples taken at the Faroes in 1926 numbered 70, in 1927, 38, making a total for the two years together of 108. Most are from May—June, but in both years, some samples were also taken in August. The samples fall into two categories, very clearly and sharply defined as a rule, to wit, those derived from the epifauna and those consisting of the fauna of the level sea floor. And a striking difference is here at once observed between the Faroe waters and others where quantitative bottom investigations have been made, great areas of the bottom at the Faroes being covered by epifauna, which in the North Sea, Kattegat and Baltic for instance, as well as in most other North-European waters, is of more restricted distribution.

Epifauna of the Solid Rock. Least in extent is the epifauna of the solid rock, i.e. that which is found where the bottom itself consists of solid rock. The coast of the Faroes continues its steep, almost perpendicular declivity down below the surface of the water to a depth of about 50 m., and there will therefore be a belt surrounding the islands from depths of 70—80 m. inward to depths where the growth of algæ begins, where looser deposits are not found on the bottom. Here, attached to the solid rock, we find a fauna characterised primarily by *Alcyonium digitatum*, and further by hydroids, composite ascidians and bryozoans; briefly, by sedentary, colony-forming species. Other forms characteristic of this area are, among the molluscs, *Anomia squamula*, *Saxicava arctica*, *Chiton*; among the annelids, *Filigrane*, the tubes of which in places form great clumps. In these groups also, we have thus mainly sedentary species. On a bottom of this type, the sampler cannot of course effect its purpose to the full, but it manages nevertheless to nip off a quantity of the fauna attached to the rock, and the samples we have from this area exhibit very nice agreement in the results (Table I). As to the quantity of organisms per sq. metre, however, it is impossible to say anything regarding this area. From the point of view of fishery-biology, the area itself may be regarded as of but very slight importance. The above mentioned sedentary colonies are practically insignificant as fish food, and we must thus suppose that many parts of the Faroe waters in the immediate vicinity of the coasts present highly unfavourable conditions of nourishment for bottom fishes. In most places, on the open coast, this area will presumably extend to a distance of 1—2 miles from land. In the sounds, however, it is much narrower, and outside the mouths of the fjords will of course be altogether lacking.

The Modiola epifauna. Far more important, both as regards extent and importance from the fishery-biological point of view is the *Modiola* epifauna, which covers large areas, both on the open coasts, outside the epifauna of the solid rock and also in the sounds between the islands. This epifauna occurs at widely differing depths, outside the islands from about 80 to 100—110 m., in the sounds at times at only a few metres' depth, e.g. in the shallow, narrow and swift-flowing channel between Strømø and Østerø. This fauna is characterised primarily by *Modiola modiolus*, which may often be met with to the number of about 50 per sq. m. further by *Ophiopholis aculeata* and *Ophiothrix fragilis* among echinoderms; among crustaceans by *Galatea nexa*, *Spi-*

rontocaris pusiola, *Eupagurus*-species and *Hyas coarctatus*, and among the annelids by *Polynoidæ* such as *Harmothoe imbricata* and *Lepidonotus squamatus*, also *Trophonia plumosa* (Table II). In addition, we find on the *Modiola* shells a rich epifauna of animals such as *Balanus hameri*, bryozoans and hydroids, together with other similar forms. Among the hydroids, *Hydrallmannia* in particular seems to be largely predominant in this area. A fauna entirely similar in its main features has previously (C. G. Joh. Petersen 1913 and 1918) been located in Danish waters, especially in the Belt Sea, and also in the narrower part of The Sound. The agreement in composition between the two areas is quite considerable; there seems, however, to be a greater number of species in the Danish waters, a greater abundance of individuals at the Faroes. As will be seen from Table II, where the contents of samples from the area of the *Modiola* epifauna are noted, very considerable weights are recorded in several cases. The figures for Kvannesund, indeed, come to over 17 kilos of organisms per sq. m. The distribution of this *Modiola* epifauna, both as regards the Faroes and the Danish waters, strongly suggests dependence on hydrographical conditions, and in particular, a constant and effective renewal of the water. Both in the Danish waters and at the Faroes this epifauna occurs in channels swept by a considerable current of water, also on open coasts, banks and shoals etc. wherever the water is likely to be frequently renewed. As regards the Faroes, it may be noted in this connection that the tidal currents here are particularly strong, and we may venture to take this as accounting for the extensive distribution of this *Modiola* epifauna in these waters. The contour of the bottom also, is a factor of some importance; in the southern part of the islands, where the coast falls away down to depths of 100 m. or over, far more steeply than in the northern islands, the *Modiola* epifauna is of comparatively slight extent, whereas outside the northern islands, where the slope is less abrupt, it forms a belt of considerable breadth.

From the point of view of fishery-biology, this epifauna is of great importance, as it contains a number of organisms furnishing excellent food for the cod, especially *Galatea nexa* and *Ophiopholis aculeata*; *Hyas* and the annelids, however, are also of importance in this respect. We may there take it that the northern part of the Faroe waters, a little distance from land (within an area lying 2—10 miles out) there should be quite good conditions of growth for cod, whereas off the southern parts of the islands, conditions must be regarded as far less favourable.

Apart from the coasts of the islands themselves and parts of the swift-flowing waters of the sounds there seems also to be some *Modiola* epifauna also on the central portion of the Faroe Bank; the number of samples from the bank is, however, as yet insufficient to afford much information on this head.

Communities of the Clay Bottom. On clay or mud bottom, which, by the way, makes up but an insignificant area in Faroe waters, we find two rather dissimilar types of fauna, the sites in most cases being fairly well defined.

The Lower Clay, or *Macoma calcarea* Community. One of these communities is, in Faroe waters, restricted to the extreme innermost parts of the fjords, where it occurs at depths of from 8—10 metres out to 20—30 metres; it is characterised by *Macoma calcarea*, which is often found here in numbers amounting to about 300

Fig. 1. The animal-communities of the Faroese waters.
a. The sand *(Mactra elliptica)* community. *b*. The *Modiola modiolus* epifauna. *c*. The deeper clay *(Axinus flexuosus)* community. *d*. The shallow clay *(Macoma calcarea)* community. *I*. The supposed limits of the *Modiola*-epifauna. *II*. The supposed outer limit of the sand community.

per sq. m. This community is remarkably poor as regards the number of other species; we may find a few specimens of other bivalves (*Abra nitida*, *Axinus flexuosus*, *Mya truncata*) and there are also some annelids, especially *Nephthys ciliata*, *Goniada maculata*

and a few other forms which may together make up about 50 per sq. m. Both in numbers and weight, however, this community is dominated completely, as will be seen from Table III, by *Macoma calcarea*. A community of similar character is found, as we shall later see, in Icelandic waters, though its distribution there is somewhat different; and C. G. Joh. Petersen (1916) has ascertained that *Macoma calcarea* is quantitatively of considerable importance in the inner part of Oslo Fjord. In other Norwegian fjords the same is stated by Broch (1927). Finally, *Macoma calcarea* is of great importance in quantitative respects in the inner part of the Baltic, between Bornholm and Gothland. As will be seen e.g. from the investigations of Thulin (1922) we find here considerable quantities of this species. It would therefore seem as if *Macoma calcarea* — in marked contrast to *Modiola modiolus* — occurs in great numbers per unit of area in more or less enclosed waters, or where, as in the deeper water layers of the Baltic, masses of water remain undisturbed for long periods, their oxygen content being therefore at times extremely low. In such localities, this species evidently finds it easy to compete with others, whereas in other situations it finds difficulty in maintaining its existence, and is accordingly met with but very sparsely and in very small numbers.

In regard to fishery biology, this community is not without importance in itself, as *Macoma calcarea* — at any rate the younger stages — and also the annelids there found, may be considered excellent food for the plaice. At the Faroes, however, this community covers only very small areas up at the base of the fjords, and can thus be of but little value. It was found at the base of all the fjords investigated.

Farther out in the fjords we encounter another community on the clay bottom, the deeper clay bottom or *Axinus flexuosus* community, which differs very perceptibly from that found farther up in shallow water. In this deeper community, which begins at about 20 m. depth and is met with out in the greatest depths of the Faroe fjords, i.e. to about 70 m., *Macoma calcarea* is, as shown in Table IV, almost entirely lacking; among the lamellibranchiata, *Axinus flexuosus* and *Abra nitida* are now the numerically dominant forms. This group is further represented by *Nucula tenuis* and *N. nucleus*; also by *Leda pernula*, *Cardium echinatum*, *Cyprina islandica* and *Thracia convexa*; these last-named species, however, are by no means of the same importance in quantitative respects as *Axinus flexuosus* and *Abra nitida*, and in contrast to these, are not represented in every sample, or even nearly so.

Gastropods are extremely few in this area; an occasional *Aporrhais pes pelecani* and *Philine scabra*; now and again also, a few *Dentalium entalis* have been found. In addition to the lamellibranchiata, it is more especially the annelids which are dominant in this community, both as regards number of species and number of individuals. Among forms particularly characteristic of the deeper clay bottom in the Faroe fjords may be mentioned *Sternaspis fossor*, which occurs in practically all samples from this area, and often in numbers equalling those of *Axinus flexuosus* and *Abra nitida*. Other annelids from this area are *Praxillella prætermissa*, *Terebellides strömi*, *Goniada maculata*, *Nephthys ciliata* etc. Crustaceans are of altogether subordinate importance; of the gammarids, some *Protomedeia fasciata* were found, of cumaceans, *Eudorella emarginata*; so also with the echinoderms, which are represented only by *Amphiura filiformis*, and this again

seems mainly restricted to the two southern fjords, Trangisvaag and Vaag, where it was found both in 1926 and 1927 in the samples taken within the area. In contrast to this, we find, in all samples from the deeper clay bottom community in the northern fjords, i.e. Fundingfjord, Skaalefjord, Kollefjord and Sundene, only a single occurrence of *Amphiura filiformis*, viz. in a sample from Fundingfjord, 1927. Precisely the opposite is the case with *Sternaspis fossor*, this species appearing — often in considerable numbers — in all samples from this community from the northern fjords, while in the southern fjords, during the two years in which samples were taken, only a single specimen was found in Vaagfjord, and none in Trangisvaag. Among other species which appear to be especially associated with this area may finally be mentioned *Virgularia mirabilis*, which occurs in several of the samples.

In respect of quality, this community is far richer than the clay bottom fauna of shallower water, having, as mentioned, in particular a fairly considerable abundance of species among the annelids and lamellibranchs. The number of individuals also can, in certain species, be quite considerable, but as we are dealing in nearly all cases with quite small forms, the total weight is as a rule rather insignificant. A particularly rich sample was taken in the northern part of Sundene, where the numbers of typical species found were as follows: 154 *Axinus flexuosus*, 32 *Abra nitida*, 32 *Nucula tenuis*, 14 *Praxillella prætermissa*, 15 *Nephthys ciliata*, and 95 *Sternaspis fossor*, besides 31 annelids comprising various species, and 2 nemerteans, all from $^1/_5$ sq. m. Despite this abundance of individuals, however, the total weight is only 13.4 g. which again amounts to 67 g. per sq. m. In the remaining samples, however, both weight and number of specimens lie considerably below these figures, the weights for small forms about 20—30 g., and only where larger specimens of *Cyprina islandica*, *Cardium echinatum* etc. occur in the samples are the weights noted more considerable, and even then nothing approaching those recorded for the *Modiola*-epifauna.

If we should compare this community with others, it seems mostly to resemble the *Amphiura filiformis* community of the Eastern Kattegat noted by C. G. Joh. Petersen (l. c.). This community, which is found on clay bottom at similar depths to those of the Faroe community here in question, is also dominated, as regards lamellibranchs, by *Axinus flexuosus* and *Abra nitida*; it is also in this part of the Kattegat that *Cardium echinatum*, *Leda pernula* etc. are found, as well as others noted in the deep clay bottom community of the Faroes. Another form common to both is *Aporrhais pes pelecani*. As regards the annelids, we find likewise considerable resemblance. *Goniada maculata* and *Lumbriconereis*, with *Pectinaria* and the *Nephthys* species are of considerable importance in both areas. Finally, *Virgularia mirabilis* is also common to both, and the only ophiur, *Amphiura filiformis*, is likewise found in both communities. This deeper clay bottom community of the Faroe fjords must thus be regarded as a variant of the communities met with on clay bottom in the Eastern Kattegat. At the Faroes, however, it is far poorer as regards number of species, and particularly so in echinoderms, which last applies also to the Faroe communities generally. Finally, the Faroe community contains a few Arctic species such as *Sternaspis fossor*, which is not met with in the corresponding Kattegat community. Otherwise, the two communities must be considered

as belonging to the same type. There is also considerable resemblance to several of the facies recently described by Molander (1928) from clay bottom in the Gullmarfjord.

From the point of view of fishery biology, the deeper clay community of the Faroes can hardly be of any great importance. In the first place, it occurs in very restricted areas. Only in the sound between Østerø and Strømø and the fjord system connected therewith (Skaalefjord, Kollefjord and Kalbakfjord) is it of even moderately great extent. And further, it is, as already mentioned, made up chiefly of small forms, so that the total weight of food organisms is on the whole but slight. And finally, the density of the organisms is as a rule not considerable. Where the density is fairly great, as for instance in the northern part of Sundene, the annelids and small bivalves of this community will, however, be able to afford fairly good conditions of nourishment for bottom fishes, especially flatfishes. But the value of this is restricted, as mentioned, by the slight extent of the community.

Besides the two clay communities already mentioned, we find in the coastal waters of the Faroes, on the level sea floor, a sandy bottom or *Mactra elliptica* community, which in qualitative respects differs most distinctly from the two clay areas. This sand community is of extremely great extent, apparently covering the entire shelf round the islands from about 110 m. (i.e. from the *Modiola epifauna*), out to at least 300 m. depth, where the steeper fall out towards the depths of the Atlantic and of the Norwegian Sea respectively begins. These great expanses of sand out here seem to be inhabited by an extremely poor community (Table V), among molluscs especially *Mactra elliptica*, to which may be added a few *Venus ovata* and *gallina*, *Tellina pygmæa*, *Psammobia tellininella* and *Limatula subauriculata*. Typical of the shallower stations in this area are *Ophiura albida*, and for the deeper, *Ophiura sarsi*. We find also now and again, *Amphiura securrigera*, and, as typically in most sandy communities, *Spatangidæ*, here represented by *Brisaster fragilis* and *Spatangus purpureus*, with now and again *Echinocyamus pusillus*. Otherwise, there are only a very few annelids and gammarids, of no quantitative importance whatever. This sand community must therefore as a rule be regarded as extremely poor both in regard to number of species and number of individuals. This result is not mainly due to the fact that the bottom sampler does not act well enough on sandy bottom, as far richer samples have been found elsewhere among the sand communities. This is very noticeably the case for instance in the corresponding community in Faxe Bay, Iceland, where it is found at far slighter depths, and also at some places in the Faroes, where sandy bottom occurs in shallower water. In Sørvaagfjord for instance, where in both years several *Mactra elliptica* were found, and at the mouth of Trangisvaagfjord, where this community yielded 175 g of organisms per sq. m., including no fewer than 325 *Limatula subauriculata*. Otherwise, the weight of organisms per sq. m. for this community in the Faroes is extremely slight, as a rule 20—30 g. at the outside per sq. m. and often only a few g.; it is also the only community in which a sample has been found to contain no organisms at all.

Comparing this community with what is known from elsewhere, we find that it very much resembles the sandy areas of the North Sea, characterised, like this one, by the occurrence of *Mactra-Venus* species and *Spatangidæ*. Only at the Faroes — occurring

as it does here at some considerable depths — it is much poorer than as a rule observed in the Kattegat and the North Sea. Where it does occur, exceptionally, in shallow water at the Faroes (30—60 m.) both quantity and quality of this community are much richer. As we shall see later on, this is even more distinctly evident in Faxe Bay.

Owing to its poverty, this community must be noted as of very slight importance in fishery biological respects. The few areas where it is at all rich are of so restricted extent as to be of no value to speak of. The very extensive deeper sand community of the Faroes, on the other hand, will hardly be able to support any great stock of fish, though a few bottom fishes, as for instance haddock, could doubtless live on the bivalves characteristic of the community. But it could hardly amount to very much.

III.

Communities of the Bottom Fauna in Icelandic waters, especially in Faxe Bay.

During the same years in which the samples were taken at the Faroes, a series of samples was also taken in Icelandic waters, especially in Faxe Bay. In 1926, 81 samples were taken, and in 1927, 83, and, as at the Faroes, nearly all with the Petersen 0.2 sq.m. bottom sampler. As regards the more thoroughly investigated area, viz. Faxe Bay, the result of these samplings may be stated as follows: the invertebrate bottom fauna in Faxe Bay is on the whole of the same type exactly as that of the Faroes, and in Faxe Bay, with the adjacent fjords connected therewith, it may be divided into precisely the same areas or communities as at the Faroes.

We find here, as at the Faroes, a distinct *Modiola* epifauna. As will be seen from Table VI, it is characterised mainly by the same species as at the Faroes. In regard to distribution, the *Modiola* epifauna of Faxe Bay does not appear to form, as at the Faroes, a continuous belt at greater depths round the coasts. This seems to be restricted to the northern part of Faxe Bay, from Budagrunn towards Snæfellsjökull, where this epifauna apparently extends out to about the same depths as noted at the Faroes, i.e. to 90—100 m. Otherwise, the epifauna is found on the whole in shallower water (20—40 m. or quite littoral), on banks (Budagrunn, Sydra Hraun) or off peninsulas and promontories, i.e. as at the Faroes, in places where the movement of the water may be supposed to be considerable. There is a large area of *Modiola* epifauna for instance, outside the peninsula which divides Hvalfjord from Kollafjord, and another outside Bessastadir, a third off Utskálar. And finally, there seem to be a number of scattered patches of *Modiola* epifauna in the southern part of Faxe Bay.

The composition of this *Modiola* epifauna in Faxe Bay is on the whole, as above noted, identical with that found at the Faroes, and similarly characterised by the occurrence of *Modiola modiolus*, *Hyas*, *Eupagurus*, *Ophiopholis aculeata* etc. The abundance of organisms in the Icelandic *Modiola* epifauna, however, does not as a rule seem quite equal to that of the corresponding community at the Faroes. As will be seen from the tables, the total weight only occasionally exceeds 2 kg. per sq. m., which is the commonest value for the Faroes; in the Icelandic community, it is often considerably below this. —

The animal-communities of Faxe Bay.
a. The sand *(Mactra elliptica)*-community. *b*. The *Modiola modiolus*-epifauna. *c*. The deeper clay *(Axinus flexuosus)*-community. *d*. The shallower clay *(Macoma calcarea)*-community.

At the Faroes, the *Modiola* epifauna was by far the most important item from the point of view of fishery-biology, the fauna of the level sea floor being either too poor, or the communities of too slight extent, to be of any considerable value. In Faxe Bay, the position is altogether different. Here, the communities of the level sea floor are also of great importance in fishery-biological respects. This is due partly to the fact that the clay communities are of far greater extent than in the fjords of the Faroes, partly

to the fact that the sand communities occur in relatively shallow water, and the abundance of organisms in this community, and thus also the amount of fish food it offers, are far more considerable than in the deep sandy community of the Faroes.

Precisely as at the Faroes, we find at the base of the fjords (Laxavogr, inner part of Kollafjord and Havnefjord) at depths within about 20 m., a clay community very distinctly lower clay community characterised by *Macoma calcarea* (cf. Table VII). But apart from these inner fjord waters, where the community, owing to its slight extent, can be of but little importance in fishery-biological respects, we find the same community extending over a fairly large area throughout the southern part of Faxe Bay, south of a line drawn roughly from Keilisnes to a little south of the extremity of Utskálar, and it is here found at depths of about 40 m. In point of composition, this community very closely resembles that noted from the corresponding area at the Faroes. *Macoma calcarea* predominates, with up to 400—500 specimens per sq. m. The total weight of this species amounts at some stations to over 350 g. per sq. m. For the rest, this community seems to be not quite so poor in species in Icelandic waters as at the Faroes, though the other forms of lamellibranchs and annelids found in the area fall considerably below *Macoma calcarea* in quantitative respects. Owing to the considerable extent of this community in the southern part of Faxe Bay, its fishery-biological importance is doubtless far greater than at the Faroes. As already mentioned in the section on the Faroes, *Macoma calcarea*, at any rate as regards its younger individuals, must be regarded as a good food item for bottom fishes; and the same may be said of the other lamellibranchs and annelids in the community. Echinoderms are of but the very slightest importance in quantitative respects, as indeed seems to be the rule with the clay bottom fauna of the Faroes and Icelandic waters.

In addition to this clay community, there is also another corresponding to the deeper clay community of the Faroe fjords, the characteristic forms being, among molluscs, *Axinus flexuosus*, among annelids *Sternaspis fossor* (Table VIII). The last-named species is also found here in great quantities, in some places up to 300 per sq. m. In contrast to the corresponding community at the Faroes, we find here, among the molluscs, also *Yoldia hyperborea*, in some samples up to 60 per sq. m. Among the characteristic annelids of this area, in addition to *Sternaspis*, may be mentioned *Nephthys ciliata*. Among echinoderms, *Ophiura albida* occurs in no small numbers. This community is of extremely slight importance in Faxe Bay and the adjacent fjords; it is only met with to any great extent in part of Hvalfjord, at depths about 30—40 m. Possibly it may exist also at greater depths (120—145 m) in the central part of Faxe Bay, as far as can be judged from a couple of samples from there, both of which contained a number of *Sternaspis fossor*. Owing to its slight extent, this area cannot of course be of any fishery-biological importance.

The sand communities of the Faroes are of slight importance in fishery-biological respects; in Faxe Bay, however, as mentioned, the case is altogether different. We find here a very widely distributed community extending from the above-mentioned northern limit for the *Macoma calcarea* community up towards Sydra Hraun, and reaching apparently farther north both to the west and to the east of this ground as far as Vestr Hraun.

On the west, the area seems to extend out to about 40 m. depth, on the east to the extreme limit of occurrence for the *Modiola* epifauna and the *Macoma calcarea* area. This area (Table IX), which in point of extent is by far the greatest in the southern part of Faxe Bay, is characterised by a sand fauna dominated primarily by *Mactra elliptica*, which in some samples amounts to over 1100 per sq. m. Among other lamellibranchs which can occur within the area may be mentioned *Cyprina islandica*, at times with 60—70 per sq. m., a few *Abra prismatica*, also *Astarte* species, especially *A. montagui*, and *Cardium ciliatum*. Among annelids seemingly common in this area may be mentioned *Onuphis conchylega*, *Glycera capitata* and *Ophelia limacina*. Echinoderms are of extremely slight importance; a few *Ophiura albida* have occasionally been found. In several cases is *Ammodytes lancea* rather abundant with 2—5 per sq. m., in one sample even per sq. m. The total weight fluctuates a good deal, in the richest samples amounting to 350 g. per sq. m., if only small forms are present; in samples containing any great number of *Cyprina islandica*, the weight far exceeds this figure, amounting in some cases to over 1000 g. per sq. m.

This community very closely resembles the sand communities known to us from the Faroes, the North Sea and the north-western Kattegat. In contrast to the deeper communities of the Faroes, the *Venus* species are lacking, and *Spatangidæ* rather few in number; another point of difference is the far greater abundance of individuals in the Icelandic community as compared with that of the Faroes. In this respect, some of the Faxe Bay stations show figures for *Mactra elliptica* approaching very nearly to the maximal values found, according to Davis (1923 p. 15) for *Mactra subtruncata*. The sandy area of Faxe Bay must therefore be characterised as a shallow water community dominated by *Mactra*, and in this respect it much resembles the sand communities of shallower water in north-western Europe, as known from the Dogger Bank and the north-western Kattegat. In its paucity of species, and the slight quantitative importance of its echinoderms, this community, like the deep clay communities of the Faroes and Iceland, must be regarded as a northern, and as it were "diluted" outpost of the north-western European communities.

In the case of the other communities, both as regards the Faroes and Icelandic waters, no essential difference could be observed in point of quantity between 1926 and 1927. The sandy community of Faxe Bay, however, seems to exhibit a quite considerable difference between the two years, the samples from 1926 showing on the whole far greater quantities of the dominant form, *Mactra elliptica*.

From the point of view of fishery biology it must be presumed that this sand community in Faxe Bay is extremely important, precisely as with the corresponding community of the Dogger Bank. As mentioned, several samples contained from 500 to 1100 specimens of *Mactra elliptica*, which is an excellent food for bottom fishes, expecially for plaice. Even though the total weight of organisms from this community often does not exceed that of those from the shallower clay community (the *Macoma calcarea* community) we must nevertheless take it that the sand community is more important in fishery biological respects, being composed of smaller species, which grow more rapidly, so that the production must presumably be greater than in the case of the slower-growing, longer-lived *Macoma calcarea*. There is therefore every reason to

suppose that this community in the south of Faxe Bay, dominanted by *Mactra elliptica*, is the most important one in fishery biological respects, particularly for the plaice fishery, and that this fishery in Faxe Bay rests mainly on this community. We have here also an excellent explanation of the great importance of Faxe Bay in the fishery, and the great contrast between the importance of the Faxe Bay fisheries and those of the coastal waters at the Faroes. In the latter, as already mentioned, there is hardly a trace of any community answering to that of the sandy bottom in shallow water in Faxe Bay.

In addition to the more comprehensive investigation of Faxe Bay here described, a number of samples were taken from other parts of the coast of Iceland; these samples are, however, still on the whole so dispersed that they do not afford any reliable general survey. From the South Coast, we have 15 samples taken at depths to 100 m. or a little over. The bottom here consists as a rule of fine black sand, and the fauna is apparently rather poor as compared with Faxe Bay. There were, however, besides annelids, a few *Mactra elliptica*, *Abra prismatica*, *Nucula tenuis* and *Dentalium entalis*, as well as a number of *Spatangidæ* (*Echinocardium flavescens*). Only the *Spatangidæ* seem here to be more numerous than in Faxe Bay, the lamellibranchs on the other hand being apparently far more scarce. It should be noted, however, that these few samples are only from a single summer; and differences in the nature of the bottom, affecting also the action of the bottom sampler, may likewise have contributed. But it is hardly too much to say that we have, on the South Coast of Iceland a sandy community with *Mactra* and *Spatangidæ*, which in point of productivity is somewhat inferior, perhaps greatly so, to the corresponding community in Faxe Bay. The total weight of organisms per sq.m. amounted here as a rule only to about 10 g.

Samples were also taken in Seydisfjord, both in 1926 and 1927. In both years we find the same result, corresponding exactly, by the way, to what is known from other fjords of Iceland and the Faroes. In the innermost waters, *Macoma calcarea* is markedly predominant, with nearly 300 specimens per sq. m.; then, at about 70—80 m., we have an area with *Leda pernula*, *Axinus flexuosus* and *Nucula tenuis* as dominant forms. In addition to these molluscs, we find here also annelids in very great numbers, in the innermost waters *Praxillella prætermissa* (amounting to 100 per sq. m.), farther out *Spionidæ* (numbering 2000—3000 per sq. m.). Besides the forms found at the Faroes, we encounter here also some arctic species such as *Yoldia hyperborea* and *Ctenodiscus crispatus*. A sample from greater depth (205 m.) outside the fjord showed, as is nearly always the case on deeper grounds, an inferior density of population, only 65 g. per sq. m. as against 1250 g. or more at 40 m. depth and 535 g. at 75 m. Out at 205 m. we find, as at greater depths in the Faroe waters and the Skagerak, *Ophiura sarsi*, among molluscs *Nucula tenuis*, as well as annelids and nemerteans.

From the North Coast of Iceland also we have a good half score of samples, mostly from Skjálfandi Bay. The invertebrate bottom fauna of the North Coast seems likewise, from these samples, to differ but little from that of the other coasts. Here also we find, up at the base of the fjord, *Macoma calcarea*, farther out *Axinus flexuosus*, *Leda pernula*, *Thracia truncata*, *Nucula tenuis*, *Cardium ciliatum*, *Astarte* species; here also the northern species *A. crenata* and finally, in several samples, great numbers of *Cyprina islandica*,

sometimes amounting to over 100 per sq. m. *Ctenodiscus crispatus* is also found. This seems to show that we have here a fauna corresponding fairly closely to that recorded from the deeper clay bottom in Seydisfjord, and, save for the occurrence of a few northerly species, resembling on the whole the clay communities in the fjords of the Faroes. From Skagafjord also we have a few samples showing precisely the same result. Two samples from Eyjafjord revealed a marked predominance of *Nucula tenuis*, with 350 and 150 per sq. m. respectively. Owing to the paucity of the samples, which were moreover, practically all taken in a single summer, it will hardly be worth while to go further into the quantitative conditions and the importance of the communities from the point of view of fishery biology. The North and East Coasts on the other hand, do not appear to have anything corresponding to the sandy fauna of the South and West Coasts, while the *Modiola* epifauna there also appears to be of more restricted and decidedly littoral distribution.

IV.

Summary of Results.

Despite the fact that the investigations of invertebrate bottom fauna in Faroe and Iceland waters here described cover only two summers, I nevertheless consider that they warrant, even at this stage, certain general conclusions.

In the first place, it is already possible to see that the invertebrate bottom fauna in various localities is of precisely similar type to that of corresponding grounds in other parts of north-western Europe. We find a *Modiola* epifauna exactly corresponding to that known from the sounds between the Danish islands and off the coasts of Scandinavia; on clay bottom in the innermost parts of the fjords the same species of mollusc predominating (viz. *Macoma calcarea*) as in several of the Scandinavian fjords and in the Bornholm Deep of the Baltic; farther out, on clay bottom again, mainly the same dominant species (viz. *Axinus flexuosus* etc.) as on clay bottom in the Kattegat and the North Sea, and finally, on the sandy floor, a fauna characterised by *Mactra*, *Venus* and *Spatangidæ*, corresponding to that found in the North Sea and Kattegat.

All these communities are, however, in the Faroe and Iceland waters, poorer in species than the corresponding communities of north-western Europe, without doubt owing to the more northerly and isolated position of the islands in question. We find already at the Faroes, and more especially in the Icelandic waters, a few arctic species which may be said to be common there, though none — apart from *Sternaspis fossor* — of dominant importance. On the other hand, there does not seem to be any indication, even on the North Coast of Iceland, of truly arctic communities similar in character to those described by Zenkewitch (1927) from the Barents Sea and the White Sea, though the Icelandic communities represent in some degree a transition towards these. A striking feature in this connection is the extreme scarcity of echinoderms, in contrast to what we find in the Kattegat and the North Sea, most of all in the clay communities; a feature which seems indeed to be characteristic of the more northerly waters.

The molluscs characteristic of the fauna in shallow and fairly calm waters of north-western Europe, *Cardium edule*, *Mya arenaria* and *Macoma baltica*, as known

from the Zuyder Zee, the coastal waters of the German North Sea coast, and most Danish waters right into the Baltic, are entirely lacking in the communities of Iceland and the Faroes. *Arenicola marina*, however, which in other parts of Europe often occurs together with the last-mentioned forms, is found at the Faroes and in southern Iceland, though only locally.

This slight investigation of the bottom fauna also furnishes an entirely satisfactory explanation of the great difference between the fisheries of the coastal waters of the Faroes and Iceland, and we can now quite understand the extreme importance of Faxe Bay as a fishing centre.

In 1914, C. G. Joh. Petersen published a chart indicating, hypothetically, by various signs the animal communities of the entire North Atlantic area. He notes here those of the coastal waters at the Faroes and Iceland as *Venus* communities, i.e. sand communities characterised by *Venus* species, *Mactra* species and *Spatangidæ*; the North Coast of Iceland, however, is marked as an arctic community characterised by *Astarte* species and *Macoma calcarea*. We can now already acknowledge C. G. Joh. Petersen's suggestion of 1914 as in the main correct, as the level sea floor outside the Faroes and off the South and West Coasts of Iceland actually is a sand community characterised by *Mactra elliptica* and *Spatangidæ*. On the other hand, the supposed arctic community on the North Coast of Iceland does not seem to agree quite so well with the results arrived at by investigation with the bottom sampler. The clay community here in deep water resembles rather that of the clay bottom in the fjords of the Faroes and South Iceland, as also that of the eastern Kattegat, though it does contain a certain contingent of arctic species. The final decision on this point, however, must be left to further investigations which may be made, at some future date. And the same applies to various other questions, notably all that concerns variations from year to year. A more precise, and more detailed examination of the local facies of the different communities also, might yield results of importance from the oecological and zoogeographical point of view, as well as from that of fishery biology.

Literature.

Broch, Hj., 1927. Untersuchungen über die marine Bodenfauna bei Lindesnes in Juni 1926. (Avhandl. norske Videnskaps-Akad. 1927). Oslo.

Davis, F. M., 1923. Quantitative Studies on the Fauna of the Sea Bottom. (Fish. Investig. Ser. II, 6). London.

Knudsen, M., 1927. A Bottom-Sampler for hard Bottom. (Medd. Komm. f. Havundersøgelser. Ser. Fiskeri, 8). Copenhagen.

Molander, A., 1928. Animal Communities on soft bottom areas in the Gullmarr Fjord (Arkiv f. Zool. 20). Stockholm.

Petersen, C. G. Joh. 1913. Valuation of the Sea II (Rep. Danish Biol. Stat. 21). Copenhagen.

— 1915. On the Animal Communities of the Sea Bottom in the Skagerak, Christiania Fjord and the Danish Waters. (Ibid. 23). Copenhagen.

— 1918. The Sea Bottom and its production of Fish-Food. (Ibid. 25). Copenhagen.

Thulin, G., 1922. Bottenboniteringar i södra Östersjön i samband med fisktrålingar. (Hydrogr. Biol. Komm. Skrifter 7). Göteborg.

Zenkewitsch, L. A., 1927. Materialien zur quantitativen Untersuchung der Bodenfauna des Barents und des Weissen Meeres. (Ber. d. wiss. Meeresinstituts 2). Moskva.

Table I. *Alcyonium*-epifauna at the Faroes.

Name of the species	St. 2567 South of Suderö 24 m. $^{2}/_{6}$ 26 Number and weight[1] of specimens pr. sq. m.	St. 2511 N. of Viderö 70 m. $^{23}/_{5}$ 26 Number and weight of specimens pr. sq. m.	St. 2511 N. of Viderö 70 m. $^{24}/_{5}$ 26 Number and weight of specimens pr. sq. m.
Anomia squamula	20-5	..	..
Saxicava arctica	5-2	..	..
Galatea nexa	..	5-2	..
Alcyonium digitatum	1-26	1-86	1-22
Styela rustica	..	5-2,5	..
Dendrodoa aggregata	5-1	..	..
Compos. Ascidiæ	..	5 Colonies 170	..

[1] weight in g.

Table II. *Modiola*-epifauna at the Faroes.

Name of species	St. 2568 S.W. of Suderö 69 m. $^{2}/_{6}$ 26 Number a. weight pr. sq. m.	St. 2569 S.W. of Suderö 97 m. $^{2}/_{6}$ 26 Number a. weight pr. sq. m.	St. 2589 Off Husagrynna 97-118 m. $^{9}/_{6}$ 26 Number a. weight pr. sq. m.	St. 3315 Off Husagrynna 82 m. $^{24}/_{8}$ 27 Number a. weight pr. sq. m.	St. 3314 Husagrynna 52 m. $^{24}/_{8}$ 27 Number a. weight pr. sq. m.	St. 3313 Off Husagrynna 112 m. $^{24}/_{8}$ 27 Number a. weight pr. sq. m.	St. 2526 Kvannesund 80 m. $^{25}/_{5}$ 26 Number a. weight pr. sq. m.	St. 2510 Off Viderö 80 m. $^{24}/_{5}$ 26 Number a. weight pr. sq. m.	St. 2512 Off Viderö 82 m. $^{24}/_{5}$ 26 Number a. weight pr. sq. m.	St. 2505 Off Viderö 90 m. $^{23}/_{5}$ 26 Number a. weight pr. sq. m.
la modiolus	10-290	35-1690	5- -	25-849,5	130-7350	- -16000	330-16500	55-1820	60-2040	55-1730
Lamellibranchiata	..	..	5- -	30-16	20-4	50-60	45-9	5-1,5	2-102,5	..
opoda	..	..	20- -	..	30-1,5	35-3,5	8-4,5	5-1,5	15-1	..
nida	..	..	..	5-0,5	5-0,5	40-2	10-1,5	..	15-1	5-0,5
tea nexa	..	5-7	5- -	..	50-9,5	60-44	50-14,5	20-8	35-5,5	5-1,5
agurus	..	..	5- -	..	..	..	5-1	..	5-1	..
s coarctatus	..	..	..	..	..	..	5-61	..	5-1	..
ontocaris pusiola	..	..	5- -	..	80-1,5	35-1	10-1	5-0,5	5-0,5	..
noidæ	..	..	..	..	..	20-6	5-0,5	..	..	5-2,5
r Annelidæ	..	..	..	205-59	20-1,5	45-6,5	10-2	..	5-0,5	5-0,5
iopholis aculeata	..	20-12,5	..	..	165-441	85-299,0	85-165	..	15-34,5	35-38
iothrix fragilis	..	..	5- -	..	..	..	10-58	..	5-6	10-16,5
ricia sanguinolenta	..	..	..	..	..	..	..	5-2,5	..	..
ng locentrotus drö-achiensis	..	..	..	..	..	..	.	5-22,5	..	..
ores	..	..	..	..	..	..	..	..	5-0,5	..
lus	..	..	..	5-1	..	90-239,0	55-370,5	5-20,2	..	..
zea	..	..	..	- -100,4	92,5	- -205	..	..	10-57,5	..
idea	..	..	..	- -20,5	18,5	- -185	..	..	..	..
gie	..	..	..	..	..	- -190	- -1,5	..	..	..

Table III. The lower clay

Name of the species	St. 2562 Vaagfjord 10 m. 1/6 26 Number a. weight pr. sq. m.	St. 2565 Vaagfjord[1]) 11 m. 1/6 26 Number a. weight pr. s q. m.	St. 2995 Vaagfjord 10 m. 9/8 26 Number a. weight pr. sq. m.	St. 3014 Vaagfjor 11 m. 20/6 27 Number a. weight pr. sq. m
Macoma calcarea	50-20	130-312,5	70- -	75-99,5
Other Lamellibranchiata	..	..	30- -	2-1,5
Dentalium entalis	..	..	..	..
Gastropoda	..	..	15- -	3-1
Nephthys ciliata	10-9,5	10-53	20	20-23
Praxillella prætermissa	50-3,5	40-8,5	500- -	100-4,5
Scoloplos arminger	..	..	15- -	..
Ammotrypane aulogaster	45-5,5	..	5- -	10-0,5
Lumbriconereis fragilis	5-1,5	..	..	..
Goniada maculata	5-0,5	20-2	160- -	120-21
Pectinaria	5-1	..	..	..
Spionidæ	..	..	1500- -	..
Other Annelidæ	..	15-2,5	85- -	135-5
Sternaspis fossor	..	..	..	..
Protomedeia fasciata	..	20-1	40- -	..
Other Amphipoda	..	..	20- -	..
Eupagurus	..	..	..	..
Asterias rubens	..	..	..	..
Ophiura texturata	..	..	..	..
Nemertes	..	..	5- -	..
Turbellaria	..	..	..	..

[1]) At Lopra Whaling-station.

ommunity at the Faroes.

. 2538	St. 3043	St. 3326	St. 3326 II	St. 2527	St. 3047	St. 2519	St. 2520	St. 2977
lefjord 6 m. /5 26	Kollefjord 18 m. 29/6 27	Kollefjord 20 m. 26/8 27	Kollefjord 20 m. 26/8 27	Skaalefjord 19 m. 26/5 26	Skaalefjord 15 m. 29/6 27	Funding- fjord 20 m. 24/5 26	Funding- fjord 10 m. 24/5 26	Funding- fjord 12 m. 4/8 26
umber weight sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.
0-187	340-294	160-212,5	130-162	130-170	310-642	280-204,5	310-383,5	330- -
5-5,5	45-5,5	85-4	75-1,6	45-7,5	540-441,5	30-3,5	8-4	40- -
..	..	..	..	..	..	..	..	5- -
..	..	..	..	..	..	5-1,5	..	..
-1,5	40-10,5	70-4,5	15-4	10-9,5	85-34	..	..	..
0-0,5	75-2,5	..	..	..	30-4	..	..	5 - -
5-2	20-1	..	..	..	5-0,5	..	15-0,5	75 - -
..	..	..	..	..	5-0,5	..	..	5 - -
5-6	30-14	..	..	..	..	..	5-1	35 - -
-0,5	20-3,5	..	..	..	..	55-6,5	60-7,4	225 - -
0-2	..	5-0,3	..	70-9	..	..	..	..
..	..	..	..	5-0,5	..	..	..	..
-0,5	..	90-2,5	5-0,3	5-0,5	10-0,5	..	..	45 - -
	..	5-0,5	5-0,3	30-6	25-12	..	..	20 - -
..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..
..	..	5-37	..	..	..	..	..	..
..	..	..	..	..	5-1	..	..	..
..	5-1	5-0,5	..	..	..	..	..	..
0,5	5-3	..	..	..	..	..	..	..

Table IV. The deeper-clay

Name of the species	St. 2564 Vaag-fjord 64 m. 1/6 26 Number a. weight pr. sq. m.	St. 3016 Vaag-fjord 62 m. 20/6 27 Number a. weight pr. sq. m.	St. 2557 Trangis-vaagfjord 32 m. 31/5 26 Number a. weight pr. sq. m.	St. 2548 Sörvaag-fjord 55 m. 29/5 26 Number a. weight pr. sq. m.	St. Sör f 5 26/ Nu a. pr.
Axinus flexuosus	55-4,5	55-3	245-6	55- -	8
Abra nitida	5-0,5	..	45-1,5	30- -	50
Nucula nucleus or tenuis	205-17	240-31,5	..	5- -	
Lucina borealis	220-145	165-122,5	..	..	5
Cyprina islandica	5-270	..	5-195	5	4-
Cardium echinatum	5-17,5	..	..	5- -	
Other Lamellibranchiata	7-24	..	20-42,5	15- -	8
Dentalium entalis	..	30-14	..	..	
Gastropoda	..	..	..	..	
Chætoderma nitidulum	..	..	..	..	
Sternaspis fossor	..	5-1	..	..	
Nephthys ciliata	45-23	40-6,5	15-8,5	10- -	
Lumbriconereis fragilis	..	..	..	10- -	2
Trophonia glauca	..	..	85-7,5	..	5
Goniada maculata	10-1,5	45-4,5	20-1	5- -	5
Ammotrypane aulogaster	..	..	..	5- -	5
Praxillella prætermissa	15-1	50-2	40-0,5	..	1
Other Annelidæ	23-2,5	265-51	40-7	..	50
Amphiura filiformis	15-2	20-3	15-4	..	
Amphipoda	10-0,5	10-0,5	5-0,5	..	
Cumacea	..	5-0,5	..	..	5
Nemertes	..	..	10-3	5- -	
Virgularia mirabilis	..	..	..	..	
Molgula sp.	..	..	40-2,5	..	

ommunity at the Faroes.

3045	St. 3325	St. 2530	St. 3048	St. 2534	St. 2543	St. 3322	St. 3309	St. 2525	St. 2516	St. 2517
lle- ord m. 27	Kolle-fjord 40 m. 26/8 27	Skaale-fjord 62 m. 26/5 26	Skaale-fjord 65 m. 29/6 27	Sundene, southern part 70 m. 26/5 26	Sundene, southern part 57 m. 28/5 26	Sundene, southern part 30 m. 25/8 27	Sundene, northern part 50 m. 23/8 27	Kvanner-sund 45 m. 25/5 26	Funding-fjord 54 m. 24/5 26	Funding-fjord 43 m. 24/5 26
mber eight q. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.
..3	65-3	15-1	35-3	170-9	10- -	150-6,5	770-28	30-2,5	100-8	90-6,5
..5	25-0,5	50-2,5	55-2,5	65-1	..	75-1,5	160-3,5	10-1	..	15-1,5
	20-0,5	35-4	40-2,5	..	5- -	80-2	160-8,5	50-12,5	..	..
	..	..	..	..	..	..	..	5-18,5	..	..
	..	..	..	..	..	..	..	15-815	20-1	5-2
	..	..	..	..	..	..	..	20-306,5	..	..
	20-42	..	15-13,5	5-1	..	15-83,5	..	..	5-0,5	5-23
	..	..	..	..	..	..	..	20-7	..	..
	..	..	..	5-1	..	..	..	10-4	10-22	..
	..	..	..	..	..	..	..	..	5-0,5	..
	70-6	20-2,5	40-6,5	55-8,5	40- -	125-6,5	475-21	..	35-6	..
..5	40-11	25-6,5	10-0,5	20-2,5	15- -	20-2,5	75-1,5	25-2,5	5-1,5	15-2
	..	..	..	..	5- -	..	..	..	5-0,5	..
	..	..	..	5-0,5	..	..	..	5-0,5	10-0,5	10-0,5
	..	..	..	..	..	..	..	..	15-1	5-0,5
	..	..	..	..	..	..	..	..	..	..
..5	..	5-0,5	..	30-1,5	..	..	70-3,5	5-0,5	10-1	10-0,5
..5	15-0,5	10-1	..	35-2	..	25-2,5	150-18	40- -	15-1,5	35-6
	..	..	..	..	..	..	..	..	..	..
	..	..	..	..	..	5-0,1	..	..	10-0,5	..
	..	..	..	..	..	..	..	..	10-0,5	5-0,5
0,5	..	..	5-0,3	..	..	..	10-2	..	10-5	5-4
	..	..	..	15-1,5	..	..	..	5-0,5	5-1	..
	..	..	..	..	..	..	..	..	..	..

Table V. The sand

Name of the species	St. 3026 Faroe Bank 168 m. 24/6 27 Number a. weight pr. sp. m.	St. 3028 Faroe Bank 103 m. 24/6 27 Number a. weight pr. sq. m.	St. 3029 Faroe Bank 120 m. 24/6 27 Number a. weight pr. sq. m.	St. 3030 Faroe Bank 160 m. 24/6 27 Number a. weight pr. sq. m.	St. 3034 Faroe Bank 120 m. 24/6 27 Number a. weight pr. sq. m.	St. 2570 S.W. of Suderö 145 m. 2/6 26 Number a. weight pr. sq. m.	St. S. Su 14 2/ Nu a. pr.
Mactra elliptica	..	..	5-2	5-2	10-2	..	
Venus gallina	..	..	..	..	..	..	
— fasciata	..	20-8,5	..	..	..	..	
— ovata	..	..	..	..	..	..	
Limatula subauriculata	..	..	..	..	..	..	
Psammobia ferroensis	10-8	..	..	..	..	..	
— tellinella	..	..	..	5-2,5	..	..	
Tellina pusilla	..	5-0,5	..	..	15-1	..	
Other Lamellibranchiata	..	15-77,5	..	10-3,5	10-1	..	
Dentalium entalis	..	..	..	..	..	..	
Gephyrea	..	..	..	..	..	..	
Annelidæ	45-3	25-8	5-0,5	..	..	..	
Amphipoda	..	..	..	..	..	5-0,5	
Galatea nexa	..	15-2	..	..	..	..	
Strongylocentrotus dröbachiensis	..	..	..	..	..	..	
Echinocardium pennatifidum	..	..	..	..	..	..	
Brisaster fragilis	..	..	..	..	..	..	
Spatangus purpureus	5-28	..	..	..	..	..	
Amphiura securrigera	..	5-0,5	..	..	..	..	
Echinocyamus pusillus	..	15-3,5	5-1,5	..	..	..	
Ophiura sarsi	..	..	..	..	..	..	
— affinis	..	..	5-0,5	..	..	..	
— albida	..	..	..	..	..	..	1
Ophiactis balli	..	..	..	5-0,5	..	..	
Amphipholis squamata	..	..	..	..	..	..	

community at the Faroes.

. 2574 W. of uderö 73 m. /6 26 umber weight . sq. m.	St. 2559 Trangis- vaagfjord 58 m. 31/5 26 Number a. weight pr. sq. m.	St. 2560 Trangis- vaagfjord 66 m. 31/5 26 Number a. weight pr. sq. m.	St. 2580 N.W. of Vaagö 94 m. 5/6 26 Number a. weight pr. sq. m.	St. 2547 Sørvaag- fjord 33 m. 29/5 26 Number a. weight pr. sq. m.	St. 3039 Sörvaag- fjord 35 m. 26/6 27 Number a. weight pr. sq. m.	St. 3052 Off Husa- grynna 115 m. 29/6 27 Number a. weight pr. sq. m.	St. 2506 N. of Viderö 160 m. 23/5 26 Number a. weight pr. sq. m.	St. 2509 N. of Viderö 160 m. 23/5 26 Number a. weight pr. sq. m.	St. 2508 N. of Viderö 170 m. 23/5 26 Number a. weight pr. sq. m.	St. 2507 N. of Viderö 270 m. 23/5 26 Number a. weight pr. sq. m.
45-2	10-23	30-3	15-1	70- -	105-117	..	5-13,5	..	..	..
..	5-1	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
5-1	25-3	15-1	..	..	..	..	..	..	..	..
15-1	320-10	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	5-4	..	..	..
15-1	..	..	..	..	5-0,5	..	..	..	..	..
..	25-8,5	..	..	..	..	5-1,5	..	5-16	..	..
..	..	..	..	..	..	..	..	..	..	..
.	20-1	..	..	..	..	..	..	..	..	..
0-1	40-4,5	5-1	..	5- -	15-0,5	15-20	30-2,5	..	5-0,5	15-1
..	..	..	..	..	..	..	..	..	.	..
..	..	..	..	..	..	..	..	..	..	..
5-18	10-5,5	..	..	..	..	..	5-4,9	..	..	..
..	5-115	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	5-297,5	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
0-1	..	..	..	..	..	10-1	..	..	..	..
5-1	..	..	..	..	..	5-1	5-0,5	..	..	..
..	..	..	..	..	..	..	..	5-7,5	5-4	15-17
..	..	..	..	..	..	..	..	..	..	..
5-2	40-3	5-3	..	..	..	..	5-2	..	..	..
..	..	..	..	..	..	..	..	..	..	..
5-0,5	..	..	..	..	..	..	..	..	..	..

Table VI. The *Modiola*-epifauna in the Faxe Bay.

Name of the species	St. 3139 Off Utskálar 39 m. 28/7 27	St. 3144 Off Utskálar 41 m. 28/7 27	St. 2679 Southern part of Faxe Bay 23 m. 1/7 26	St. 2646 Off Havnefjord 32 m. 25/6 26	St. 3149 Off Havnefjord 29 m. 28/7 27	St. 3133 N.W. of Havnefjord 25 m. 28/7 27	St. 2633 Akranes 55 m. 21/6 26	St. 2669 Off Hvalfjord 30 m. 30/6 26	St. 3184 Off Kollafjord 23 m.	St. 320 Budagrunn 59 m. 6/8 27
	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.
Modiola modiolus	5-165	30-48,5	15- -	15-173,5	5-131,5	15-235	90-1145	70- -	70-1750	15-3
Other Lamellibranchiata	5-83	..	10- -	..	..	5-0,5	5-0,5	..	65-174	25-2,5
Chitonidæ	..	..	..	5-0,5	..	10-2	..	..	15-1	..
Gastropoda	5-263,5	..	15- -	5-1	..	5-0,5	..	..	5-1	40-8,5
Galatea nexa	..	5-5	..	..	..	..	5-0,5	..	..	..
Hyas coarctatus	..	..	10- -	..	..	..	10-2,5	..	..	10-1,5
Eupagurus	..	5-0,5	20- -	..	..	..	5-1	10- -	..	..
Amphipoda	..	..	..	15-0,5	..	..	..	..	..	..
Ophiopholis aculeata	..	..	5- -	30-48,5	..	15-20	5-0,5	..	5-0,5	..
Ophiura albida	..	..	..	..	..	..	..	50- -	..	..
Asterias	..	..	..	..	5-4,5	..	..	..	..	10-10,5
Potamilla	..	..	..	800-218,5	400-78	..	..	750- -	..	..
Other Annelidæ	120-7	625-125	210- -	45-12	70-40,5	10-0,5	50-6	45- -	180-34	350-66
Bryozoa	- -2	- -2,5	..	..	..	..	..	..	..	- -0,5
Ascidiæ	..	..	5- -	..	..	..	..	..	3	- -469
Hydroidea	..	..	..	..	..	..	..	..	- -0,5	- -6
Actiniæ	..	..	..	..	..	..	5-0,5	..	..	..

Table VII. The lower clay or *Macoma calcarea*-community at Iceland.

ame species	St. 2642 Havne-fjord 6 m. $^{25}/_{6}$ 26	St. 2643 Havne-fjord 15 m. $^{25}/_{6}$ 26	St. 3130 Havne-fjord 8 m. $^{28}/_{7}$ 27	St. 3131 Havne-fjord 15 m. $^{28}/_{7}$ 27	St. 2675 Southern Part of Faxe Bay 33 m. $^{1}/_{7}$ 26	St. 3170 Southern Part of Faxe Bay 35 m. $^{2}/_{8}$ 27	St. 3171 Southern Part of Faxe Bay 35 m. $^{2}/_{8}$ 27	St. 2660 a Hval-fjord 6 m. $^{30}/_{6}$ 26	St. 3184 Kolla-fjord 11 m. $^{3}/_{3}$ 27	St. 2605 Seydis-fjord 40 m. $^{13}/_{6}$ 26	St. 3086 Seydis-fjord 32 m. $^{12}/_{7}$ 27	St. 3101 Skjálfandi 20 m. $^{14}/_{7}$ 27
	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.
calcarea ..	510-350	180-82,5	130-96,5	345-60,5	210-536,5	100-340,5	170-38,5	210-14	465-74	245-941	145-371,5	55-143
melli-												
iata	510-43	85-8	65-12	85-4,5	40-148	50-26	30-353,5	110-33	105-4,5	65-286,5	..	105[1])-2300
entalis..	..	..	..	..	..	..	10-6	..	..	..	..	..
la.....	5-0,5	5-12	5-20,5	5-1	..	..	..	..	20-12	..	..	5-0,5
ciliata...	20-5,5	..	15-1,5	..	5-16,5	60-29,5	50-13,5	..	80-7,5	10-36,5	..	..
nereis												
.....	..	..	..	..	15-3	..	10-3,5	..	..	15-9	25-3,5	..
.....	10-1	..	45-6	..	..	..	..	..	..	..	..	..
apitata...	..	..	150-2	..	..	..	..	..	..	..	..	..
missa	..	10-1	..	..	..	125-7,5	250-14,5	..	..	100-3,5	..	..
armiger ..	140-4	20-0,5	..	..	..	..	..	..	..	..	..	..
nelidæ....	5-0,5	20-1,5	..	50-4	40-3,5	125-7,5	60-1	50-1,5	150-1,5	200-3,5	20-0,5	125-7,5
fossor...	..	..	..	..	20-3	15-1,5	5-0,5	..	235-22	..	..	..
a.....	..	..	..	5-0,5	10-0,5	5-0,5	15-1	5-1	..	..	..	15-0,5
ctatus ...	10-9,5	..	..	..	..	..	..	..	..	..	..	..
lbida	..	..	..	5-0,5	..	..	..	..	..	..	..	..

[1]) yprina islandica.

Table VIII. The deeper clay or *Axinus flexuosus*-community at Iceland.

Name of the species	St. 2661 Hval-fjord 38 m. $^{30}/_{6}$ 26 Number a. weight pr. sq. m.	St. 2662 Hval-fjord 38 m. $^{30}/_{6}$ 26 Number a. weight pr. sq. m.	St. 2664 Hval-fjord 34 m. $^{30}/_{6}$ 26 Number a. weight pr. sq. m.	St. 2663 Hval-fjord 67 m. $^{30}/_{6}$ 26 Number a. weight pr. sq. m.	St. 2608 Seydis-fjord 75 m. $^{13}/_{6}$ 26 Number a. weight pr. sq. m.	St. 2606 Seydis-fjord 83 m. $^{13}/_{6}$ 26 Number a. weight pr. sp. m.	St. 3087 Seydis-fjord 85 m. $^{12}/_{7}$ 27 Number a. weight pr. sq. m.
Axinus flexuosus	55-2	..	..	..	15-1,5	20-2	15-1,5
Nucula tenuis	..	..	..	..	45-6	60-9	45-6
Yoldia hyperborea	10-12	70-134	35-90,5	..	..	10-9	15-12,5
Cardium ciliatum	..	..	..	..	45-243,5	5-1,5	..
Mya truncata	..	..	..	..	15-165,5	..	..
Other Lamellibranchiata	5-0,5	..	..	..	30-14	30-21,5	30-29,5
Sternaspis fossor	40-1	40-1	20-1	300-9	..	..	..
Nephthys ciliata	15-3,5	15-2,5	20-5	15-5	..	15-32,5	5-1
Spionidæ	..	..	..	..	2500-33	250-7,5	..
Other Annelidæ	10-0,5	..	..	..	..	5-1,5	150-9
Ophiura albida	115-12,5	65-6,5	55-6,5	20-2	..	..	..
Ophiura sarsi	..	..	..	..	35-15,5	..	..
Ctenodiscus crispatus	..	..	..	..	..	..	5-44,5
Amphipoda	..	..	..	..	20-1	5-0,5	..
Hyas coarctatus	..	..	..	..	5-3,5	..	..
Eupagurus	..	..	..	..	5-6,5	..	..
Cumacea	..	..	..	..	..	10-0,5	..
Nemertes	..	..	..	..	..	5-12,5	..

Table IX. The sand or *Mactra*

Name of the species	St. 2634 Faxe Bay Sydra Hraun 28 m. $^{21}/_{6}$ 26	St. 2648 Faxe Bay 38 m. $^{25}/_{6}$ 26	St. 2649 Faxe Bay 37 m. $^{27}/_{6}$ 26	St. 2650 Faxe Bay 37 m. $^{27}/_{6}$ 26	St. 2651 Faxe Bay 36 m. $^{27}/_{6}$ 26	St. 2652 Faxe Bay 37 m. $^{27}/_{6}$ 26
	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.
Mactra elliptica	675-250,5	15-0,5	50-15	35-49	90-72,5	480-75
Psammobia tellinella	15-6,5	..	..	..	..	..
Abra prismatica	..	10-2	..	..	..	..
Astarte montagui	..	20-23	..	..	..	..
— borealis	..	..	..	5-141,5	..	..
Cyprina islandica	..	75-184	..	..	30-538,5	90-1087
Cardium ciliatum	..	5-1,5	..	..	..	..
Other Lamellibranchiata	10-121,5	5-11	..	..	..	..
Gastropoda	15-16,5	5-3	20-2	5-2,5	15-7	..
Ophelia limacina	5-3	..	5-0,5	..	5-0,5	..
Onuphis conchylega	..	..	20-2	35-8	25-7,5	15-3
Glycera capitata	..	..	5-0,5	5-0,5	5-0,5	..
Other Annelidæ	..	..	5-0,5	20-1,5	20-1	..
Ophiura albida	..	25-6,5	..	..	..	10-1
Strongylocentrotus dröbachiensis	..	..	..	..	5-3,5	..
Echinocardium flavescens	..	..	5-1,5	..	..	..
Asterias or Henricia	15-184,5	..	..	..	..	..
Ammodytes lancea	..	..	5-23,5	5-35,5	5-35	..
Eupagurus	..	..	..	..	5-1,5	5-1,5
Amphipoda	..	..	..	..	..	..

elliptica-community at Iceland.

St. 2655 Faxe Bay 27 m. $^{27}/_{6}$ 26	St. 2657 Faxe Bay 37 m. $^{27}/_{6}$ 26	St. 2672 Faxe Bay Sydra Hraun 38 m. $^{1}/_{7}$ 26	St. 3145 Faxe Bay S. of Sydra Hraun 39 m. $^{28}/_{7}$ 27	St. 3146 Faxe Bay S. of Sydra Hraun 39 m. $^{28}/_{7}$ 27	St. 3178 Faxe Bay E. of Sydra Hraun 28 m. $^{2}/_{8}$ 27	St. 3189 Faxe Bay N. E. of Sydra Hraun 38 m. $^{5}/_{8}$ 27	St. 3192 Faxe Bay W. of Sydra Hraun 51 m. $^{5}/_{8}$ 27	St. 3066 W. of Portland 50 m. $^{6}/_{7}$ 27	St. 3070 Medalland Bay 120 m. $^{8}/_{7}$ 27
Number a. weight pr. sp. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.	Number a. weight pr. sq. m.
1120-266,5	65-26	170-41,5	55-24	145-159,5	20-7	15-2,5	..	15-12,5	..
..	..	..	..	..	5-1	..	25-9	..	..
..	5-1,5	..	..	..	..	10-0,5	..	..	..
..	..	..	..	..	5-4	10-0,5	..	..	..
..	..	..	..	..	..	..	..	..	..
60-6	65-108,5	35-259	40-1221,5	5-119,5	..	..	..	..	..
..	5-3	..	..	..	..	..	..	..	..
5-0,5	10-17	..	..	..	..	..	..	..	..
45-24,5	..	10-6	..	..	5-1,5	15-19	5-1	..	10-0,5
10-0,5	..	..	..	..	..	..	..	..	..
10-1,5	5-0,5	..	..	..	..	..	..	..	..
10-2	..	..	..	..	..	..	..	..	..
5-0,5	..	..	80-9,5	75-47	10-4,5	..	15-20	20-6	20-4
..	..	..	..	..	..	10-1	..	..	15-2
..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	100-6,5
..	..	..	..	..	..	..	..	..	..
..	..	5-26,5	30-113	70-203,5	100-210,5	..	..	..	..
..	..	..	..	..	..	..	..	..	..
30-0,5	..	..	..	..	..	..	..	..	..

AGE-COMPOSITION OF THE STOCK OF COD IN EAST ICELAND FJORDS DURING THE YEARS 1925—27

BY

ÁRNI FRIÐRIKSSON

CONTENTS

	Page
Introduction	3
A. Composition of the Stock of Cod in Year-groups	3
B. Notes on the Size and Growth of the Cod	5

Introduction.

The present little paper is based on a number of age-determinations of cod (*Gadus callarias* L.) from Icelandic waters. The investigations were carried out at the Carlsberg Laboratory in Copenhagen. During the years 1925—27, about 10.000 cod from Iceland were subjected to age determination. The greater part of the material in question was collected by the Danish research vessel "Dana"; some, however, by the Scottish research vessel "Explorer", some by an English trawler, and some received from Fiskerikonsulent Sæmundsson, Iceland. The determinations were made from the otoliths, but in a few cases, the scales were used to check the results. The otoliths were broken across the middle, the broken surface damped with about 70 per cent. alcohol, and examined under a binocular microscope with magnification about × 50, in direct light. In this way, the age of the specimens could nearly always be determined with certainty from the dark "winter rings". Where any uncertainty was felt, owing to the number of rings, or the presence of secondary rings etc. the broken surface had to be polished in order to give reliable results. I hope therefore that the view here presented more or less correctly represents the actual state of things; errors possibly attaching to the determinations being of altogether subordinate importance in practical respects.

The object of the investigations was primarily to ascertain the age-groups of which the stock of cod from the various coasts of Iceland is composed.

A. Composition of the Stock of Cod in Year-groups.

That part of the investigations here briefly to be noticed comprises a quantity of material collected by the "Dana" during the past three years on the East Coast of Iceland. This material is particularly valuable and instructive. The data from the other parts of the coast will only be mentioned occasionally for comparison.

Three of the largest stations from the "Dana" investigations in East Iceland waters may be taken as representative of the three years. These are: St. 2468, Seydisfjord August 13th, 1925, St. 2604, Seydisfjord June 12th-13th, 1926, and St. 3089, Hjeradsflói July 12th, 1927. The number of age-determined specimens from these three stations is particularly large, the respective figures being 2203[1]), 388[2]) and 446[3]), making

---

[1]) Implement used: Eel seine.

[2]) — — —

[3]) — — 50 ft. Otter Trawl. The total no. of cod taken at this station was 1467.

in all over 3000, and we may therefore expect to get a fairly correct view of the numerical proportions of the year-groups, as the stations in question are not exceptional in any way. It should be noted, however, that while the two first stations were worked with the eel seine, the trawl (otter trawl) was used in the case of the last one. Moreover, the last station lies in a somewhat different locality from the two first. It is included here, to represent 1927, as being by far the largest of all East Iceland stations in that year; the sources of error above noted are of subordinate importance owing to the slight distance between the localities, and the similarity in regard to general conditions.

Table 1 shows the results of the age determinations from Station 2468. It should be noted, however, that the majority of the specimens here included in the I-group were not age-determined, as no time was left to collect otoliths from all the specimens catched. This however, was not at all necessary, as the I-group was excellently distinguished from the rest. As will be seen from the table, the number of cod taken at this station was 2203. The great majority, 2148 fish, belong to the I-group, i.e. the 1924 year-class, the II- and III-groups being represented by only 43 and 12 specimens respectively. The I-group is thus altogether predominant.

Table 2 shows the position at Station 2604, representing 1926. Of the total material, 338 specimens in all, the I-group has 49, the II-group 320, the III-group 17 and the IV-group only two. As will be seen, the II-group is here by far the strongest.

Finally, Table 3, Station 3089, shows the figures for the East Coast in 1927. The material, 446 specimens in all, is composed of the II-, III-, IV-, V- and VI-groups, represented by 73, 345, 15, 9 and 4 specimens respectively. We have here the III-group predominating, while the I-group is lacking.

Common to all these stations is the absence of the 0-group, doubtless owing to the fact that it had not yet reached the East Coast at the time when the stations were taken (from July 12th to August 13th)[1]).

Tables 1—3 show thus clearly the comparative strength of the age-groups in regard to number of individuals, also the variation in length of specimens within each group. On comparing the three tables, it is evident that there is in all cases a distinct predominance of a single age-group characteristic of each year, viz. the I-group in 1925, the II-group in 1926 and the III-group in 1927, i.e. the same year-class throughout, that of 1924[2]). In 1925, it constitutes 97.50 per cent., in 1926, 82.47 per cent., and in 1927, 77.35 per cent. of the entire stock (cf. Fig. 1). In 1925, it makes up very nearly the whole of the stock, but becomes somewhat less prominent in course of time, owing, among other things, to the introduction of younger groups in the following years.

Such a surprising result naturally suggests that the year 1924 must have been an uncommonly good spawning year for cod on the Icelandic banks. And a question here arises: is the 1924 year class found in the same majority all round the shores of Iceland as on the East Coast? The answer is given in Table 4, showing Icelandic stations

[1]) Dr. Johs. Schmidt: Fiskeriundersøgelser ved Island og Færøerne i Sommeren 1903. Skrifter udgivet af Kommissionen for Havundersøgelser Nr. 1. 1904.

[2]) cf. Johs. Schmidt: The Frequency of young cod ect., Fig. 63—64. Rapp. et Proc. Verb. XXXIX, 1926.

from 1924—27 at which cod to the number of at least 100 were taken; and it is in the negative. The table shows the relative strength of the age-groups at the different stations. There are 9 stations noted from the East Coast, of which 8 from 1925—27 account for a total of 3903 specimens. Of these, 3583 are divided among 5 stations, and in this great mass of material, the 1924 year-class is greatly predominant, yielding no fewer than 3066 specimens, or about 86 per cent. At three of the 8 East Coast stations from 1925—27, 320 cod were taken. The 1924 year class is met with here as well, but other year classes slightly exceed it it numbers. This applies in higher degree to the 11 stations noted from the North and South-west coasts. With exception of two stations from Faxe Bay in 1925, the 1924 year-class is weak throughout, in most cases either far behind the rest or entirely lacking.

We thus arrive at the result that the cod of the 1924 year-class were, from 1925 onwards, greatly predominant in numbers on the East Coast of Iceland; a phenomenon which must nevertheless be regarded as primarily restricted to the East Coast, as other year-classes, here but poorly represented, predominate on other parts of the coast.

Since the 1924 year-class is relatively very strong throughout a very great mass of material, it follows that it must have been numerous in the absolute. The cause of this abundance will not, however, be discussed here, but must be presumed to lie in two distinct factors: 1) a good spawning year in 1924, the possibility of which has already been suggested, and which was undoubtedly realised; and 2) a more or less complete concentration of the year-class in question in East-Icelandic waters.

B. Notes on the Size and Growth of the Cod.

With regard to growth and size of the cod in East Iceland I would refer to Table 5, where the three youngest groups from 6 stations taken in 1925—27 are noted.

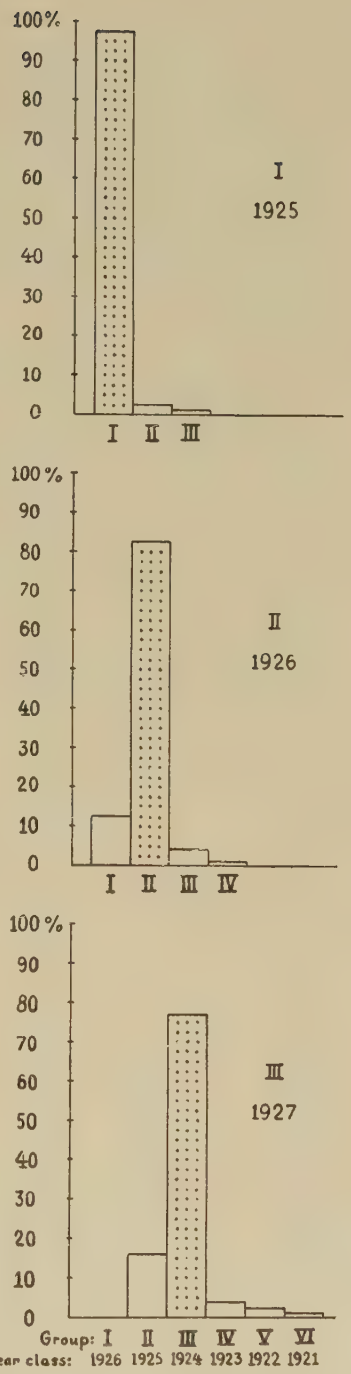


Fig. 1. Percentages of the different age-groups of Cod in Seyðisfjord 1925, 1926 and 1927

Table 6 shows the variations in length and the average lengths for the I—III groups from the "Dana"s principal station in East Iceland. The annual increment for the II- and III-groups is also noted.

On comparing the average lengths with those arrived at by SÆMUNDSSON[1]), we find a fairly close agreement; and the same applies to the annual increment. SÆMUNDSSON finds an average length of 13.7 cm. for the I-group, 22.4 cm. for the II-group and 33.4 for the III-group, whereas our figures for the three groups are 13.47, 23.51 and 34.75 cm. respectively. The annual increments for the II- and III-groups, i.e. the differences in length between II-group and I-group, III-group and II-group respectively, as shown in Table 6, are 10.04 and 11.24 cm.; SÆMUNDSSON here finds 10 and 11 cm. for corresponding sizes, so that the figures agree very nicely.

There is more variation apparent in the average lengths for each age group from the stations noted in Table 5. The differences can, however, be explained by the fact that the material was collected at different times, so that it would hardly be permissible to make any direct comparison. In many cases, the groups are represented by very small numbers of specimens, and the differences in average length, considerable as they may seem, need not therefore by any means be of a biological character, but can be explained away mathematically by the mean error. The limits of error are often very extensive. In order to give an idea of the magnitude of the mean error in the material in question, this has been calculated for the age-groups noted in Table 6, the limits of error being likewise noted.

---

[1]) BJARNI SÆMUNDSSON: On the Age and Growth of the Cod (*Gadus callarias* L.) in Icelandic waters. Medd. fra Komm. for Havunders. Serie Fiskeri, Bd. VII, No. 3.

Table 1. Cod.

"Dana". August 13th, 1925. **St. 2468.** Seyðisfjord.

Length in cm.	I-group			II-group			III-group			Total			Total
	♀	?	♂	♀	?	♂	♀	?	♂	♀	?	♂	♀+?+♂
50	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	1	..	..	1	1
44	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	1	..	..	1	1
38	..	..	..	..	..	.	1	..	2	1	..	2	3
37	..	..	..	..	..	..	..	..	..	..	..	..	..
36	..	..	..	..	..	..	..	..	1	..	..	1	1
35	..	..	..	..	..	..	..	..	..	..	..	..	..
34	..	..	..	..	..	..	..	..	..	..	..	..	..
33	..	..	..	..	..	..	..	..	1	..	..	1	1
32	..	..	..	..	..	..	..	..	..	..	..	..	..
31	..	..	..	..	..	2	..	..	2	..	..	4	4
30	..	..	..	..	..	..	..	..	1	..	..	1	1
29	..	..	..	..	..	..	1	..	1	1	..	1	2
28	..	..	..	1	..	..	..	..	..	1	..	..	1
27	..	..	..	2	..	..	..	..	..	2	..	..	2
26	..	..	..	2	..	1	..	..	..	2	..	1	3
25	..	..	..	3	..	3	..	..	..	3	..	3	6
24	..	..	..	1	..	4	..	..	..	1	..	4	5
23	..	..	..	5	..	4	..	..	..	5	..	4	9
22	..	..	..	4	..	2	..	..	..	4	..	2	6
21	..	..	..	3	..	1	..	..	..	3	..	1	4
20	..	..	..	1	..	1	..	..	..	1	..	1	2
19	1	..	2	2	..	..	..	..	..	3	..	2	5
18	7	..	2	1	..	..	..	..	..	8	..	2	10
17	..	30	..	..	..	..	..	..	..	..	30	..	30
16	..	84	..	..	..	..	..	..	..	..	84	..	84
15	..	254	..	..	..	..	..	..	..	..	254	..	254
14	..	606	..	..	..	..	..	..	..	..	606	..	606
13	..	749	..	..	..	..	..	..	..	..	749	..	749
12	..	310	..	..	..	..	..	..	..	..	310	..	310
11	..	79	..	..	..	..	..	..	..	..	79	..	79
10	..	24	..	..	..	..	..	..	..	..	24	..	24
Number	8	2136	4	25	0	18	2	0	10	35	2136	32	2203
Total		2148			43			12			2203		
Average length in cm.	18.12		18.50	23.00		24.22	33.50		35.00				
		13.47			23.51			34.75					

Implement used: Eel seine.

Table 2. Cod.

"Dana" 1926. June 12th—13th 1926. **St. 2604.** Seyðisfjord.

Length in cm.	I-group			II-group			III-group			IV-group			Total			Total
	♀	?	♂	♀	?	♂	♀	?	♂	♀	?	♂	♀	?	♂	♀+?+♂
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	1
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	1
40	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	1
39	..	..	..	..	..	..	2	..	..	..	..	..	2	..	..	2
38	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	2	..	..	..	..	..	2	..	..	2
36	..	..	..	..	..	..	1	..	1	..	..	..	1	..	1	2
35	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
34	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
33	..	..	..	..	..	..	1	..	2	..	..	..	1	..	2	3
32	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
31	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	1
30	..	..	..	..	..	..	1	..	1	..	..	..	1	..	1	2
29	..	..	..	..	..	..	1	..	1	..	..	..	1	..	1	2
28	..	..	..	2	3	..	..	1	..	..	..	..	2	4	..	6
27	..	..	..	..	6	1	..	1	..	..	..	..	..	7	1	8
26	..	..	..	11	..	9	..	..	..	..	..	..	11	..	9	20
25	..	..	..	19	..	11	..	..	..	..	..	..	19	..	11	30
24	..	..	..	9	..	13	..	..	..	..	..	..	9	..	13	22
23	..	..	..	19	..	19	..	..	..	..	..	..	19	..	19	38
22	..	..	..	25	..	24	..	..	..	..	..	..	25	..	24	49
21	..	..	..	15	..	20	..	..	..	..	..	..	15	..	20	35
20	..	..	..	12	..	14	..	..	..	..	..	..	12	..	14	26
19	..	..	..	21	..	24	..	..	..	..	..	..	21	..	24	45
18	..	..	..	17	2	10	..	..	..	..	..	..	17	2	10	29
17	..	..	..	3	..	9	..	..	..	..	..	..	3	..	9	12
16	..	1	..	..	2	..	..	..	..	..	..	..	..	3	..	3
15	..	5	..	..	..	..	..	..	..	..	..	..	..	5	..	5
14	..	4	..	..	..	..	..	..	..	..	..	..	..	4	..	4
13	..	8	..	..	..	..	..	..	..	..	..	..	..	8	..	8
12	..	17	..	..	..	..	..	..	..	..	..	..	..	17	..	17
11	..	7	..	..	..	..	..	..	..	..	..	..	..	7	..	7
10	..	5	..	..	..	..	..	..	..	..	..	..	..	5	..	5
9	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	1
8	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	1
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Number	0	49	0	153	13	154	9	2	6	1	0	1	163	64	161	388
Total	49			320			17			2			388			
Aver. length in cm.	12.22			21.77		21.44	34.56		33.50	46.00		41.00				
				21.74			33.35			43.50						

Implement used: Eel seine.

Table 3. Cod.

"Dana". July 12th, 1927. St. 3089. Hjeraðsflói.

Length in cm.	II-group		III-group		IV-group		V-group		VI-group		Total		Total
	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀	♂♂	♀♀+♂♂
71	..	..	..	..	..	..	..	..	1	..	1	..	1
70	..	..	..	..	..	..	..	1	1	..	1	1	2
69	..	..	..	..	..	..	..	..	..	..	..	..	..
68	..	..	..	..	..	..	..	..	..	1	..	1	1
67	..	..	..	..	..	..	..	..	..	..	..	..	..
66	..	..	..	..	..	..	..	..	..	..	..	..	..
65	..	..	..	..	..	..	..	..	..	..	..	..	..
64	..	..	..	..	..	..	..	..	..	..	..	..	..
63	..	..	..	..	..	..	..	1	..	..	..	1	1
62	..	..	..	..	..	..	..	..	..	1	..	1	1
61	..	..	..	..	..	..	..	..	..	..	..	..	..
60	..	..	..	..	..	..	3	..	..	..	3	..	3
59	..	..	..	..	..	..	..	..	..	..	..	..	..
58	..	..	..	..	..	..	..	..	..	..	..	..	..
57	..	..	..	..	..	..	..	..	..	..	..	..	..
56	..	..	..	..	..	..	..	1	..	..	..	1	1
55	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	2	..	..	..	2	..	2
53	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	1	..	..	..	..	..	1	..	1
48	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	2	..	..	..	..	..	2	2
44	..	..	..	1	..	..	..	..	..	..	..	1	1
43	..	..	..	..	1	2	..	..	..	..	1	2	3
42	..	..	2	3	2	..	..	..	..	..	4	3	7
41	..	..	1	4	1	..	..	1	..	..	2	5	7
40	..	..	3	5	1	..	..	..	..	..	4	5	9
39	..	..	5	7	..	1	..	..	..	..	5	8	13
38	..	..	8	8	..	1	..	..	..	..	8	9	17
37	..	..	13	4	..	2	..	..	..	..	13	6	19
36	..	..	19	15	1	..	..	..	..	..	20	15	35
35	..	..	19	19	..	..	..	..	..	..	19	19	38
34	..	..	15	23	..	..	..	..	..	..	15	23	38
33	..	..	19	23	..	..	..	..	..	..	19	23	42
32	..	1	23	10	..	..	..	..	..	..	23	11	34
31	..	..	17	18	..	..	..	..	..	..	17	18	35
30	..	..	16	15	..	..	..	..	..	..	16	15	31
29	..	..	5	3	..	..	..	..	..	..	5	3	8
28	2	5	7	7	..	..	..	..	..	..	9	12	21
27	3	3	2	2	..	..	..	..	..	..	5	5	10
26	9	11	..	1	..	..	..	..	..	..	9	12	21
25	5	4	..	..	..	..	..	..	..	..	5	4	9
24	4	5	1	..	..	..	..	..	..	..	5	5	10
23	6	6	..	..	..	..	..	..	..	..	6	6	12
22	4	4	1	1	..	..	..	..	..	..	5	5	11
21	..	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	..	..	..	..	..	..	..	..	..	..	..
Number	33	39	176	169	7	8	5	4	2	2	223	222	
Total	73		345		15		9		4		446		446
Aver. length in cm.	24.85	25.26	33.49	33.83	41.86	48.88	57.60	57.40	70.50	65.00			
	25.00		33.66		41.33		57.51		67.75				

Implement used: 50 ft. Otter Trawl.

Table 4. Some Icelandic

The dominant age-group is empha

Part of Coast	East Coast							
Locality	Seyðisfjord					Outside Seyðisfj.	Hjeraðs-flói	Glett
Station	2221 E. S.[1])	2468 E. S.	2604 E. S.	2956 E. S.	3084 E. S.	St. 1 Haul no. 659 C. O. T. 1 h.	3089 50. O. T. 5 h.	329 Lon Lin
Date	$^{29}/_{7}$ 1924	$^{13}/_{8}$ 1925	$^{12\text{-}13}/_{6}$ 1926	$^{1\text{-}2}/_{8}$ 1926	$^{12}/_{7}$ 1927	$^{11}/_{6}$ 1925	$^{12}/_{7}$ 1927	$^{18}/_{8}$ 1
Research ship	Dana	Dana	Dana	Dana	Dana	Explorer	Dana	Dar
I-group	2	**2148**(*1924*)	49	95	45	..	..	..
II-group	**113**(*1922*)	43	**320**(*1924*)	**138**(*1924*)	48	6	73	..
III-group	5	12	17	15	**51**(*1924*)	37	**345**(*1924*)	18
IV-group	..	..	2	..	2	**84**(*1921*)	15	22
V-group	..	..	..	..	2	32	9	**49**(*1*
VI-group	..	..	..	..	..	12	4	35
VII-group	..	..	..	..	..	6	..	10
Other groups	..	..	..	..	..	..	..	9
Total catch	120	2203	388	248	148	177	446	143

[1]) Abbreviations: E. S. = Eel seine. 50. O. T. = 50 feet Otter Trawl. C. O. T. = Commercial Otter Trawl. h = duration

Table 5. Average length of I—III-groups.

Year	1925		1926		1927	
Date	$^{11}/_{6}$	$^{13}/_{8}$	$^{12\text{-}13}/_{6}$	$^{1\text{-}2}/_{8}$	$^{12}/_{7}$	$^{18}/_{8}$
Vessel	Explorer	Dana	Dana	Dana	Dana	Dana
Station	St. 1 Haul no. 659	2468	2604	2956	3084	3287 + 3289
I-group	..	13.47	12.22	13.27	13.58	18.50
II-group	22.83	23.51	21.74	23.87	24.19	25.17
III-group	31.84	34.75	33.35	28.73	31.69	35.88

27, yielding over 100 cod.
year of origin noted in brachets.

North Coast					South-west Coast				
Skjálfandi Bay				Hrísey	Faxe Bay				
2458 O. O. T. 6 h.	2459 50. O. T. $^1/_2$ h.	2790 50. O. T. 5 h.	St. 11 Haul no. 739 C. O. T. 1 h.	2864 E. S.	2129 50. O. T. 12 h.	C. O. T.	St. 33 Haul no. 892 C. O. T. 1 h.	2445 50. O. T.	2443 + 2446 50. O. T. 15 h.
$^{?}/_{8}$ 1925	$^{10}/_{8}$ 1925	$^{11}/_{7}$ 1926	$^{15}/_{6}$ 1925	$^{24}/_{7}$ 1926	$^{11}/_{6}$ 1924	$^{10\text{-}14}/_{7}$ 1924	$^{24}/_{6}$ 1925	$^{1\text{-}6}/_{8}$ 1925	$^{1\text{-}7}/_{8}$ 1926
Dana	Dana	Dana	Explorer	Dana	Dana	Commercial Trawler	Explorer	Dana	Dana
5	..	..	..	26	27	..	..	**136**(*1924*)	85
1(*1923*)	..	..	**104**(*1923*)	24	**259**(*1922*)	61	**316**(*1923*)	74	**163**(*1924*)
4	60	45	24	**67**(*1923*)	37	50	286	15	101
0	**86**(*1921*)	**92**(*1922*)	9	10	6	**51**(*1920*)	75	5	13
0	21	64	6	..	2	33	7	7	4
1	..	4	1	..	5	22	6	2	3
9	..	1	2	..	1	10	1	..	..
1	..	..	..	..	1	21	..	..	..
1[1])	167	206	146	127	338	248[2])	691	239	369

ed and scaled.

Table 6. St. 2468. Variations in length etc. (cf. table 1).

Age group	I	II	III
Variation in length in cm.	10—19	18—31	29—45
Average length in cm.	13.47	23.51	34.75
Mean error in cm.	1.29	2.92	4.79
Limits of error in cm.	12.18—14.76	20.59—26.43	29.96—39.54
Annual increment in cm.	?	10.04	11.24

PLAICE INVESTIGATIONS IN ICELANDIC WATERS

BY

Å. VEDEL TÅNING

CONTENTS

Page

I. Introduction 3

II. Short review of the Plaice Fishery in Icelandic Waters 4

III. Some numerical characters in Icelandic Plaice 7

IV. The life history of the Plaice in its first year with special regard to the occurrence of the bottom stages of the 0-group 12

1. Short survey of the occurrence of eggs and pelagic fry 13

2. The occurrence of the bottom stages of the 0-group 17

V. The Stock of Plaice on feeding grounds in South, West, North, and East Iceland 32

1. South and East Iceland 33

Material p. 33. Remarks on the material etc. p. 35. Numerical proportion of sexes p. 37. Age-composition and fluctuations p. 37. Rate of growth etc. p. 43. Hydrography and rate of growth p. 49.

2. West Iceland. Faxe Bay 53

Material p. 53. Remarks on the material p. 54. The stock of plaice inside and outside Faxe Bay p. 55. Marking experiments previously made in Faxe Bay p. 59. Age-composition and fluctuations p. 59. Rate of growth p. 64.

3. North Iceland. Skjálfandi Bay 69

Material p. 69. Remarks on the material p. 70. Decrease in number of plaice, numerical proportion of sexes etc. p. 71. Age-composition and fluctuations p. 73. Rate of growth p. 77.

4. General review of Age-composition, Fluctuations and Rate of Growth in the Stock of Plaice 81

Age-composition p. 81. Fluctuations p. 83. Rate of growth p. 87.

VI. Length and Weight in Icelandic Plaice 89

Summary 92

Appendix. Tables I—XXXIV 95

Bibliography 132

I. Introduction.

Investigations as to the stock of plaice in Icelandic waters were taken up after the late war by the North Western Area Committee of the International Council for the Exploration of the Sea, and the work with the research vessel "Dana" commenced in 1924 by the Danish Committee for the Study of the Sea, under the leadership of Professor Johs. Schmidt, and continued in 1925, 1926 and 1927; in 1925, the Fishery Board for Scotland assisted in the work, a cruise being made by the research vessel "Explorer", under the leadership of Dr. Alex. Bowman. Finally, with the co-operation of English and Icelandic authorities, measurements of trawl catches have been made, and collections of otoliths etc. for the elucidation of various questions regarding the stock of plaice in Icelandic waters have been furnished by Dr. Bjarni Sæmundsson and others.

For the rest, investigations as to the stock of plaice in these waters have been in progress since 1903 under the leadership of Professor Johs. Schmidt, the various fields of work being as follows:

Position and extent of the principal spawning grounds have been investigated; and in conjunction with this the age and size of the fish on reaching maturity; the migrations of Icelandic plaice on attaining maturity have likewise been studied, by means of marking experiments[1]). Further, the occurrence of the 0-group round the coasts of Iceland has been investigated with regard to quantity, place and time. Growth, quantity, occurrence, fluctuations etc. of the age-groups on various grounds have been investigated; this work forms part of a general investigation of the stock of fish inside and outside the territorial limit in different parts of Iceland, the principal locality being Faxe Bay. In conjunction with this, the occurrence of the youngest age-groups in the coastal waters adjacent to the respective trawling grounds has likewise been studied. Also, in connection with the same group of experiments, continued marking of plaice, investigation of their food, and corresponding quantitative determination of the fish food of the sea bottom. Apart from the publications already mentioned, Johs. Schmidt has, in the "Administrative reports from the North Western Area Committee of the International Council for the Exploration of the Sea" ("Rapp. et Procès-Verbaux des Réunions" 1926 f.) given brief surveys of the results of some of the trawlings, especially in Faxe Bay. In addition, material of plaice from Faxe Bay and Skjálfandi Bay (1924) has been briefly surveyed by the present writer in "Rapp. et Procès-Verbaux" Vol. XXXIX 1926, p. 152—168; occasional reference to this will be made in the following pages.

In the "Fiskeri-Beretning" from 1891—1906 we find some information especially as to sizes and quantities of plaice in different Icelandic fjords and bays. A. C. Johansen

[1]) Cf. Johs. Schmidt 1907 and Bj. Sæmundsson 1913.

(1903) has given very valuable details based upon investigations in the years 1898—1900. The only work on age determinations based on otoliths of plaice from Iceland is that of K. Jessen (1909), dealing with material collected in different fjords in 1908 on the west and north-west coast of Iceland. K. Jessen has investigated about 2000 specimens, and he points out that the growth of plaice in West and North-west Iceland varies from one fjord to another (growth in Skutulsfjord (Ísafjord) and Dýrafjord more rapid than in Havnefjord, Patreksfjord and Ønundarfjord). The material from 1908 and that employed in this work is not directly comparable, as the stock of plaice in Icelandic waters during the last 20 years and more has been subject to a fishery which here, as in other waters, most probably has altered the rate of growth, age-composition etc.; moreover, the fishing implements used have been quite different. Bj. Sæmundsson has in 1926 (and in 1908) given a brief survey of the knowledge regarding the plaice in Icelandic waters.

The present work deals mainly with two very important phases in the life-history of the plaice in Icelandic waters, viz. the phase when the plaice, passing from the pelagic to the demersal stage of development, take to the bottom and appear for the first time in shallow water, and the long phase in its life when the fish is feeding on the grounds with depths mainly about 10—50 metres. But also other points in the life history of the plaice have been dealt with in connection with the above noted.

It is hoped that the present work has brought forward some points of interest for future research, and at least rendered it easier to see where subsequent investigations should best be made in these extensive waters.

I wish to express my sincere thanks to Professor Johs. Schmidt for his encouragement and helpful advice.

II. Short review of the Plaice Fishery in Icelandic Waters.

As we know, Icelandic waters constitute the most north-westerly part of the area in which we find the plaice in the North Atlantic, as this species has not reached the western coast of the Atlantic. Compared with the North Sea, the area suitable for feeding plaice in Icelandic waters is far inferior in extension; the Icelandic plaice area is restricted to a rather small belt round the island, in many places interrupted by stony and rocky areas very poorly frequented by plaice.

Friedrich Faber wrote a hundred years ago (Naturgeschichte Fische Islands 1829, p. 138) that the fishery on plaice was completely neglected by the Icelanders themselves. This state of things has only been altered during the last 25 years. The greater part of the catch in Icelandic waters goes, as we know, to England, but increasing quantities of plaice are now being taken by the Icelanders themselves. The first beginning of the Iceland plaice fishery was when the trawlers extended their operations to these waters, at the close of last century. In the summer of 1891 the first English steam trawler shot a trawl in Icelandic waters, off Ingólfshøfdi (cf. Holt 1893—95, p. 129 f.). Of late years, a few smaller vessels have taken to fishing for plaice with the Danish seine in

Icelandic waters, whereas previously, apart from some Danish seine net fishing and flounder net fishing practised by Danish fishermen about 1890—1900, trawling was practically the only method employed.

The annual yield of the plaice fishery in Icelandic waters, according to the International Statistics, amounts to fully 5 million kilos, or rather more than $^1/_{10}$ that of the North Sea fishery. The accompanying graph, (Fig. 1) shows the fluctuations in the yield (in 1000 tons) for those years for which statistics are available. For purposes of comparison, the curves for the North Sea and for the Barents Sea fishery are here included. It will be noted that in the case of the Barents Sea, where the fishery was

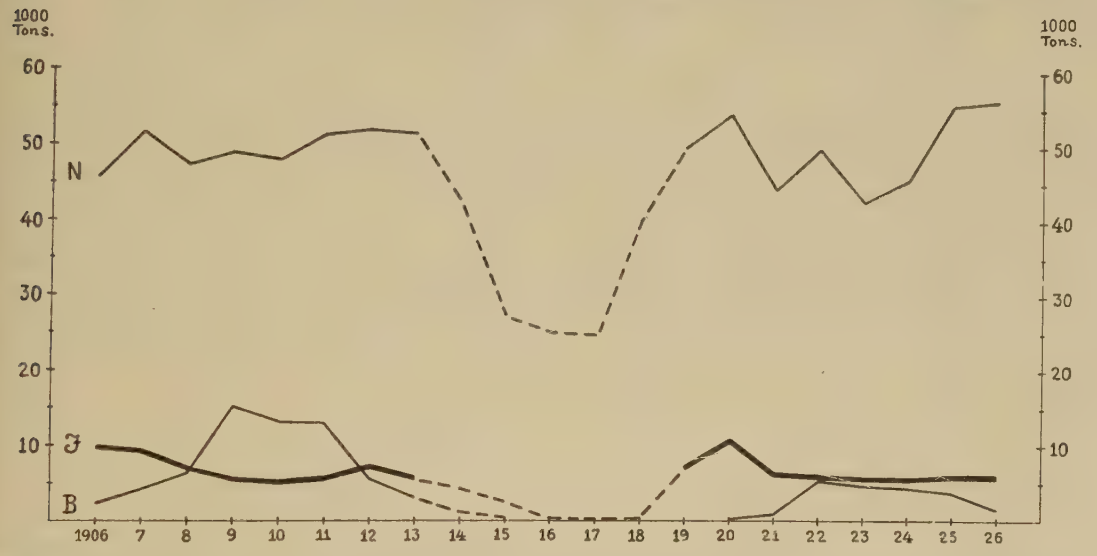


Fig. 1. Diagram illustrating total quantities of plaice in 1000 tons taken in various areas during the years 1906—26. N: North Sea, I: Iceland, B: Barents Sea. (Cf. International Statistics).

started in 1905, the yield in 1909—11 far exceeded that of the Icelandic waters, but soon fell below it. In 1922, when the Barents Sea fishery was resumed in earnest after the war, the yield rose to something approaching that of the Icelandic fishery, but has during the last few years again exhibited a downward tendency.

The following table shows the details for Iceland during the years 1906 to 1926.

[1][1]. Iceland. Yield of Plaice fishery in tons (International Statistics).

1906	9.836	1913	5.565	1920	10.368
1907	9.075	1914	4.205	1921	6.014
1908	6.747	1915	2.506	1922	5.872
1909	5.523	1916	303	1923	5.601
1910	4.933	1917	41	1924	5.244
1911	5.552	1918	202	1925	5.920
1912	6.733	1919	6.803	1926	5.856

[1]) Number of Tables in text.

The curve for the Icelandic plaice fishery, save for the first years, when fishery was working what was relatively a virgin stock, tends apparently towards the type found in places like the North Sea, where the yield plainly corresponds to what the stock can produce, or even, according to some writers, more than this. The catch per 100 hours trawling, however, is still much beyond that of the North Sea, as will be seen from the following figures taken from the British Fishery Statistics (Steam Trawlers):—

[2]. Average catch pr. 100 hours trawling (cwts.).

	1922	1923	1924	1925	1926
Iceland	56	50	42	48	44
North Sea	14	12	14	15	16
Barents Sea.....	870	251	151	152	94

Now the rate of growth of the plaice on many parts of the coast of Iceland is inferior to that of the North Sea fish (cf. chapter V), and there can thus be little doubt but that the stock in Icelandic waters, if subjected to any heavy overfishing, would react in a manner similar to that of the Barents Sea, i. e. exhibiting a pronounced decline in the annual yield.

English statistics are available from 1906 onwards, and these show very plainly indeed that the large stock of old plaice was rapidly exhausted by the fishery. The curves in Fig. 2 show, firstly the total yield of the English trawl fishery for plaice in

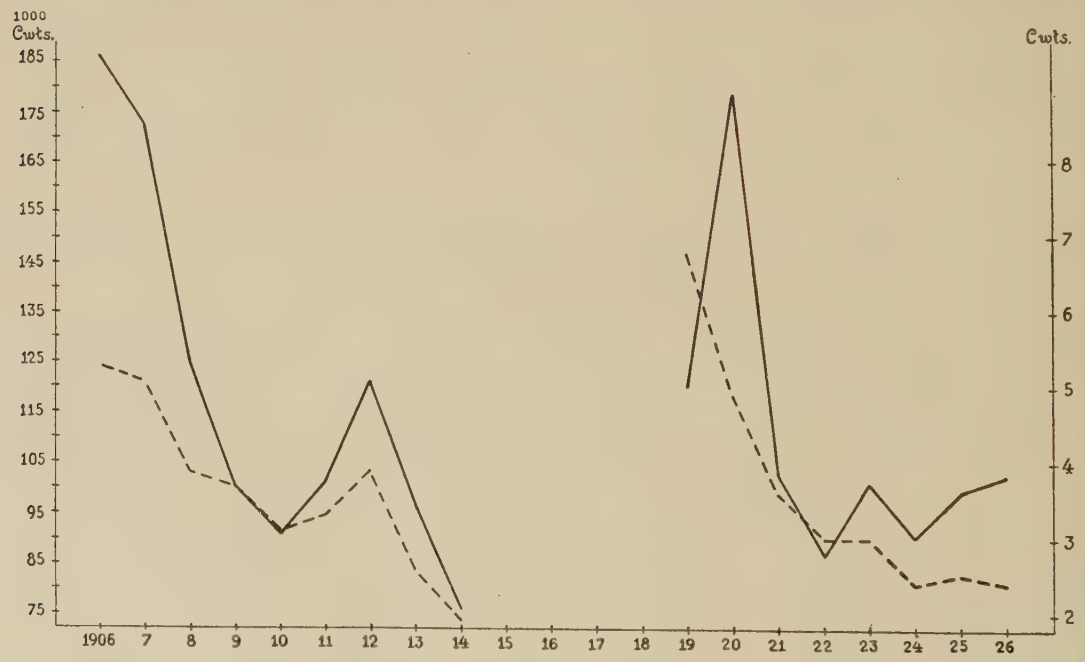


Fig. 2. Diagram illustrating yield of English trawlers' plaice fishery in Icelandic waters during the years 1906—26. (From "Sea Fisheries-Statistical Tables" Fisheries Department, London.) ———— Total catch in 1000 Cwts. (scale to the left). – – – – Cwts. per day's absence from port (scale to the right).

Icelandic waters, and further, the fluctuations in the catch per day's absence from port, the latter being of course the best indication of the fluctuations in the size of the stock. Despite some variation in the quantity for the years just before the war, and the increase observed immediately after the war years, during which the stock had been left untouched, it will nevertheless be seen that the catch per day's absence from port — and in the last few years also per 100 hours' fishing[1]) — is now less than before. And this agrees, in the main, with what has been observed on other fishing grounds within the range of distribution of the species.

The division of the material in the statistics into "Large", "Medium" and "Small" brings out very plainly the marked decrease in the amount of large plaice; the following table gives the figures for this (in 1000 cwts.).

[3]. Yield in 1000 cwts. of the three main statistical categories.

	Large	Medium	Small		Large	Medium	Small
1906.....	111	74	2	1915—1918..	..	..	..
1907.....	96	74	2	1919.....	15	104	1
1908.....	67	53	4	1920.....	[1])	[1])	[1])
1909.....	40	54	6	1921.....	20	76	7
1910.....	33	54	4	1922.....	16	65	6
1911.....	39	56	6	1923.....	17	73	11
1912.....	40	74	8	1924.....	15	57	18
1913.....	32	59	6	1925.....	15	60	24
(1914.....	21	48	6)	1926.....	14	65	23

[1]) 1920: Total *179*, not separated in different sizes.

The period of rest during the war thus produced, in Icelandic waters as elsewhere, a stock of larger fish, and mainly of the "Medium" size class, whereas the "Large" size plaice were much in minority. But the yield soon falls again to what it was in the years before the war, or even less, and the number of "Small" plaice in the catches brought to market shows here, as in the North Sea, a pronounced increase. A peculiarity is noticeable in regard to the "Large" plaice in that none of the post-war years (1920, however, not known) reaches the figures recorded for these large fish in the years before the war. This may, however, possibly be due in some degree to dislocation in the limits of the categories, as these vary somewhat both according to time and place (port); see with regard to this, J. O. Borley and D. E. Thursby-Pelham, 1925, p. 43 f.

III. Some Numerical Characters in Icelandic Plaice.

The distribution of the plaice in the North Atlantic shows that migration from the Faroe area to Iceland has taken, or may still be taking place, presumably passively by the currents in the pelagic stage, as the Icelandic plaice must originally have come from the Faroe area or from somewhere else farther to the south-east, since the

[1]) See Table [2], which gives all available figures per 100 hours trawling from the Statistics.

species is, as we know, not found at all in the Western Atlantic. The stock of plaice in Icelandic waters on the other hand, is doubtless to a high degree self-contained, without immigration or emigration of any importance[1]).

The investigations of recent years have shown that the stock of plaice is extremely elastic in regard to growth etc. and that the environment (locality, food, temperature etc.) exerts an enormous influence upon the stock. The numerical characters in fish are likewise, albeit only in the earliest stages, to some extent affected by environment; the temperature, or whatever it may be, which sets its mark on the numerical values, being of decisive importance not only as between one locality and another but also between one year and another; even, indeed, from the commencement to the close of the period in which a year-class develops (SCHMIDT 1917—21; HUBBS 1922 and others). The plaice will hardly be any exception to the other fishes hitherto investigated in regard to this plasticity of the numerical characters, but will doubtless reveal something genotypical and something phænotypical in these characters, when once we have succeeded in experimenting with this species throughout the whole of its ontogenesis.

A. C. JOHANSEN (1903, p. 224 f.) points out that the Icelandic plaice resembles the form distributed in the northern part of the North Sea, the Skagerak and northern Kattegat; and, like this, the Icelandic plaice differs from the form met with in the inner Danish waters in having a greater number of fin rays.

The following numerical values from Iceland are recorded by previous investigations (A_n: A = average, n = number of specimens):

No. of rays in dorsal fin:
Reydarfjord (East Iceland) $A_{108} = 73.46$ (JOHANSEN 1903).
No. of rays in anal fin:
Hornefjord (South-east Iceland) $A_{16} = 54.37$ (JOHANSEN 1903).
Axarfjord (North-east Iceland) $A_{50} = 54.36$ (OTTERSTRØM 1904).
Westmanna Isles (South Iceland) $A_{100} = 54.12$ (JOHANSEN 1903).
No. of vertebræ:
Axarfjord (North-east Iceland) $A_{15} = 43.20$ (OTTERSTRØM 1904).

As far as I am aware, no information has been published since these data as to the numerical values for the Icelandic plaice, and it will be natural therefore here to give some figures further illustrating the relation of Icelandic plaice to more southerly stocks in regard to some numerical characters, especially the number of vertebræ.

Vertebræ have been counted in a total of 960 plaice from Icelandic waters. A survey of the material is given in the table below [4]. The following observations may be added regarding the various samples, the age determinations of which will be found in the tables of the Appendix. The sample from South Iceland is from Landeyjasandr (St. 3156), and the plaice belong more especially to the V-group. The sample from West Iceland is from Faxe Bay (St. 3127) and consists mainly of the IV—VII age-groups,

[1]) The marking of 3300 plaice in Icelandic waters during the years 1903—27 has not yet revealed a single instance of individuals emigrating from the Icelandic area.

[4]. Numerical characters in Icelandic Plaice from different localities.

	Year-class	South (1922+)	West (1922+)	North-West 1) 1924	North-West 2) 1927	North 1) (1922+)	North 2) 1927	East (1922+)
Total number of vertebræ	45	..	1	2	5	5	5	..
	44	27	41	60	41	56	60	45
	43	82	77	147	63	53	53	62
	42	10	13	27	7	9	1	8
	n	119	132	236	116	123	119	115
	A	**43.143**	**43.227**	**43.157**	**43.379**	**43.463**	**43.580**	**43.322**
	σ [1])	± 0.545	± 0.625	± 0.616	± 0.669	± 0.695	± 0.592	± 0.601
	P. F. A.	± 0.169	± 0.184	± 0.135	± 0.209	± 0.212	± 0.179	± 0.189
Number of prehæmal vertebræ	14	2	2	1	5	10	16	2
	13	108	127	223	106	108	101	107
	12	9	3	12	5	5	2	6
	n	119	132	236	116	123	119	115
	A	**12.941**	**12.992**	**12.953**	**13.000**	**13.041**	**13.118**	**12.965**
	σ	± 0.311	± 0.217	± 0.241	± 0.295	± 0.348	± 0.373	± 0.280
	P. F. A.	± 0.096	± 0.064	± 0.053	± 0.092	± 0.106	± 0.115	± 0.088
Number of hæmal vertebræ	32	..	1	3	4	4	1	..
	31	30	40	65	44	51	55	46
	30	83	80	146	60	61	61	64
	29	6	11	22	8	7	2	5
	n	119	132	236	116	123	119	115
	A	**30.202**	**30.235**	**30.208**	**30.379**	**30.423**	**30.462**	**30.357**
	σ	± 0.514	± 0.604	± 0.614	± 0.669	± 0.647	± 0.551	± 0.565
	P. F. A.	± 0.159	± 0.177	± 0.135	± 0.209	± 0.197	± 0.171	± 0.178

Number of rays in dorsal fin:
North-west Iceland 1924

Number	Frequency
78	2
77	2
76	14
75	16
74	18
73	31
72	38
71	34
70	26
69	23
68	10
67	10
66	1
65	1
64	1
n	227
A	71.678
σ	± 2.557
P. F. A.	± 0.573

Number of rays in anal fin:
North-west Iceland 1924

Number	Frequency
58	3
57	13
56	26
55	40
54	34
53	52
52	39
51	13
50	9
n	229
A	53.729
σ	± 1.828
P. F. A.	± 0.407

[1]) Formulæ employed: $\sigma = \pm\sqrt{\frac{\Sigma a p^2}{n-1} \div b^2}$; $P.E.A. = \pm\frac{\sigma}{\sqrt{n}} \times 0.6745$; $P.F.A. = 5 \times P.E.A.$

especially V—VI. The samples from North-west Iceland were taken 1) in Ønundarfjord in 1924 and 2) in Dýrafjord 1927, and consist solely of 0-group fish (see Appendix, Table I). The samples from North Iceland are 1) from Skjálfandi Bay (St. 3265), the plaice belonging to the IV—VII-group, especially V—VI, and 2) from Húsavík 1927, 0-group plaice (see Appendix, Table I). The sample from East Iceland was taken in Hjeradsflói (St. 3284) and the fish belong especially to the V-group, as with the sample from South Iceland. The samples thus belong to different year-classes, that of 1922, however, predominating in four of the samples, that of 1927 in two.

In the sample from North-west Iceland, the number of rays in dorsal and anal fins was noted in addition to the number of vertebræ; this will be seen from Table [4]. In these counts, the material was stained with alizarin and subsequently clarified with xylol (cf. Tåning 1927). It is convenient to use the bottom stages of the 0-group for racial investigations with plaice — when the work is not associated, for instance, with a study of the migrations of the adult stages — as the bottom stages of the 0-group are excellently amenable to staining, and the numerical values can thus be noted as easily and accurately as could possibly be expected. We have here a convenient method of making sure what year-class we are dealing with; a point of importance when considering the question of possible variations from year to year. The above-mentioned earlier counts of the fin rays (p. 8) can of course only be used with all reserve for comparison with the results of counts made from 0-group fish, as they were made from adults, without staining. The number of vertebræ, on the other hand, offers but little likelihood of different results being arrived at by different methods, and can therefore be used for comparison of adult and juvenile specimens of the 0-group without any staining of the former.

If we now consider the data furnished by Duncker 1896, 1913, Cunningham 1897, Kyle 1900, Johansen 1910 and Keilhack 1913 for numerical values in the plaice from that part of its area of distribution comprised by the North Sea, the inner Danish waters and the Baltic, we find the following values as compared with those here noted for Iceland; only the highest and the lowest values from the respective areas are, however, here included:—

[5].

	Total no. of vertebræ	Prehæmal vertebræ	Hæmal vertebræ
Baltic-North Sea.....	42.324—43.046	12.669—12.969	29.47 —30.116
Iceland.....	43.143 —43.580	12.941—13.118	30.202— 30.462

	No. of dorsal fin rays	No. of anal fin rays
Baltic-North Sea.....	67.103—72.98	49.13 —55.06
Iceland.....	71.678—73.46	53.729—55.51[1])

[1]) Seydisfjord 1909, 0-group, 63 specimens (A. Strubberg).

Successive investigations have shown, in the case of a great many species of fish, that the number of vertebræ is higher in the Icelandic than in more southerly forms; and this is also found to hold good as regards the plaice. As to the number of rays in D and A, a similar state of things also exists, which was to be expected, as there is a slight positive correlation between the number of vertebræ and number of rays in D and A (Duncker 1913, p. 226). It will also be noted, from the samples of Icelandic

plaice given above [4], that the highest values for number of vertebræ are found on the East, North and North-west Coast, i.e. in the coldest waters. The difference between samples from South and North Iceland amounts to nearly the same as has been found between samples from the Baltic and the North Sea. As mentioned in the next chapter, some spawning takes place on the cold coasts; the spawning is, however, mainly confined to the South and West Coasts, the young fish being gradually distributed thence, by current and migration, to the North and East Coasts as well (cf. hydrographical notes p. 49 f.). The greater number of vertebræ on the East and North Coasts is therefore presumably due to an intermingling of young fish which have grown up in colder waters and there developed a higher average number of vertebræ, with young fish brought by the current from warmer waters where they acquired a low average number of vertebræ.

There is nothing to suggest the existence in Icelandic waters of a special race of plaice stationary along the North and East Coasts; such an assumption would hardly be compatible with what we know as to the migrations of the species in these waters (cf. Schmidt 1907). The variations in the numerical values above noted in Icelandic waters must rather be regarded, it would seem, as purely phænotypical; and the investigation of a distinct year group at numerous localities all round the coasts should thus, according to the foregoing, reveal a steady transition from the lowest number of vertebræ to the highest, corresponding to a fall of temperature from relatively high to relatively low values, representing the conditions under which the plaice have passed their period of pelagic development. It is probable, however, that not only temperature leads to variations in the number of vertebræ, as also the chemical nature etc. of the surroundings may be an important source of variation.

The stock of plaice in Icelandic waters thus exhibits, in regard to the numerical characters investigated, at once a difference from the stock found in the south-eastern parts of its area of distribution, and variations within the Icelandic area itself, as also probably from year to year (cf. number of vertebræ from North-west Iceland 1924 and 1927). Whether the former is exclusively genotypic, the latter purely phænotypic, is a matter which must presumably be left for experiment to determine. No investigations have been made of Icelandic plaice in regard to other racial characters commonly employed, such as proportions etc. in relation to the south-easterly forms (see also Chap. VI, p. 89).

We may here note a point first brought forward by A. C. Johansen in 1903, viz. that the curve for length of individuals in the 0-group often shows two maxima. This was demonstrated in 1903 with material from Heimaey (Westmanna Isles) taken on the July 22nd, 1901; the curve in question is here reproduced in Fig. 7 p. 30 together with one for 1924 showing distribution in regard to length for a large sample from North-west Iceland (Ønundarfjord July 16th—18th, 1924). Others resembling this might be mentioned, as for instance one from Skagastrand 1926 (see Appendix, Table I). It will be noticed that the curves plainly show two summits, which are not an indication of the presence of two year-classes (the material was partly age-determined) but probably arise either 1) from division of the spawning or hatching and following devel-

opment into two distinct periods, or in two distinct localities, or 2) from death in a certain period of the larval or postlarval stage (probably caused by lack of proper food), 3) or from an interruption in the supply of young pelagic fry to the localities in question (probably owing to alteration in the course of the current).

Numerical investigations of the individuals in the 1924 material showed that specimens of less than 17 mm. and those over 23 mm., i.e. the two summits of the curve, do not differ to any great degree in the numerical values for most of the characters considered.

[6]. Number of hæmal vertebræ in 0-group plaice from North-west Iceland.

No.	Specimens below *17 mm.*	Specimens over *23 mm.*
32	3	..
31	38	27
30	72	74
29	11	11
n	124	112
A	30.266	30.143
σ	± 0.652	± 0.572
P. F. A.	± 0.198	± 0.182

It will, however, be seen from Table [6] showing the number of hæmal vertebræ that the smallest specimens show the highest average, though the difference is small. The hæmal portion of the vertebral column exhibits the greater variation in number of segments, and is, as far as we know, that part of the vertebral column which is most affected by the environmental changes. Now it is evident, judging from the prevailing currents in these waters, that the smallest specimens are of a more northerly (i.e. colder) origin than those over 23 mm. length; probably therefore the higher average in specimens smaller than 17 mm. length may be of real signification. It must thus be admitted that the investigation of the sample from 1924 points to a different origin in place of the individuals representing the two summits; but it is, however, quite uncertain whether this is the general cause for the development of a bimodal curve in 0-group plaice in Icelandic waters, or other of the causes mentioned may be held responsible.

IV. The Life-History of the Plaice in its first year, with special regard to the occurrence of the bottom stages of the 0-group.

The principal spawning grounds of the plaice in Icelandic waters are those of the South and West Coast; it is evident that the majority of the plaice which had kept to the North and East Coasts during the years between the pelagic stage and

maturity, migrate to the banks of the South and West in order to spawn. Marking experiments have clearly shown that the mature plaice move from the two "cold" coasts to the warmer waters of South and West Iceland (Johs. Schmidt 1907; see especially the chart Pl. I. Cf. also Schmidt's work on the Gadoids, 1909).

1. Short survey of the occurrence of eggs and pelagic fry.

The occurrence of eggs and of pelagic fry in the spring months off the coasts of Iceland also clearly points to a state of things such as that indicated above; we will here give a brief survey of the occurrence of eggs in Icelandic waters, partly in the height of the season and partly towards the close. Pelagic investigations have been made in these waters in all years when Danish research vessels have been cruising there, in the months of April to September. On the other hand, circumnavigations of the island during which investigations of the fish eggs were performed have only been undertaken a few times, and in the following pages the main results of these investigations are given.

The chart Fig. 3, p.14 shows the occurrence of plaice eggs in Icelandic waters during the period from April 15th—27th, 1904[1]). The research vessel "Thor" was cruising round Iceland at that time, starting from the south-eastern corner and proceeding thence south, west, north and eastward round the coasts; at all stations, a pelagic net was hauled for 10 minutes horizontally at the surface. The net was a silk net of the usual conical form, 90 cm. diameter at the mouth. The number of plaice eggs varied from 0 to close on 300 per 10 minutes' haul. The quantities are noted on the chart according to the following scale: + denotes 0; the smallest circles stand for numbers below 20, as a rule from 1—10; circles of medium size denote about 50—100; and the largest circles about 150—300 eggs.

The isotherms for a depth of 50 metres are marked on the chart, and it will at once be seen that in April, the plaice eggs are found in greatest numbers in those parts of the Icelandic waters where the temperature is highest, viz. off the West and South Coasts. There is a sporadic occurrence of eggs discernible along the cold East Coast, but the numbers are always very small, about 1—3 specimens per 10 minutes' haul. Along the North Coast there are comparatively few stations near land; it is likely that hauls made closer inshore would have yielded similar, altogether minimal quantities, of eggs to those from the East Coast.

Passing then to consideration of the position about six weeks later in the season, we find an altogether different state of things as regards the distribution of plaice eggs. We are now drawing upon the material from investigations made by the "Dana" in 1924; during the period from June 2nd—9th of that year, the vessel sailed round Iceland along the East, North, West and part of the South Coast; on this cruise, a pelagic net was used, similar in size and construction to that employed in 1904. The hauls were, however, only of 5 minutes' duration, made horizontally, at the surface. The result of these fishing experiments is shown in the chart Fig. 4; the circles denote

[1]) Eggs determined by A. Strubberg during the cruise.

spots where plaice eggs were found, the sign + being used for those where none were taken. On comparison with the chart Fig. 3 it will be seen that a very great change has taken place in regard to the distribution of the eggs in the course of the six weeks or so (apart from possible difference from year to year). We find, that at the beginning of June, there are no plaice eggs in South and West Iceland, and that at this season, they are found practically speaking, only on the East Coast; it is possible that investigations closer inshore on the North Coast might have revealed a

Fig. 3. Distribution of Plaice eggs in Icelandic waters in the month of April. R/S "Thor", April 15th—27th, 1904. Silk net, 10 minute hauls. ● = abt. 150—300 eggs, ● = about 50—100 eggs, ● = < 20 eggs, + = no eggs taken. The isotherms at a depth of 50 metres are indicated.

scattered occurrence of eggs, the isolated find (1 spec.) at the boundary between North and West Iceland seems to point in this direction. There must then be some spawning on the East Coast, at any rate in certain years; the number of plaice eggs found was rather small in comparison with the numbers taken in April on the South-west Coast; hauls of five minutes' duration yielding from 1 to 15 specimens. The greatest numbers were taken at the three stations on the East Coast from Seydisfjord to Lánganes, viz. 10—15 per haul, which is considerably above the number taken here in April 1904.

The isotherms for a depth of 50 metres are marked on the chart; about this depth and deeper we find the spawning plaice. It will be seen that the area where plaice eggs are found has temperatures about 1.5°—5° (1.59°—4.49°), and eggs are no longer found along the South and West Coast where temperatures are now about 7° C.

The plaice require as we know 5—6° C. for spawning in the North Sea (Ehrenbaum 1910, p. 166), i.e. the same temperature which in Icelandic waters is the best for spawning, though here as elsewhere lower and higher temperatures may serve.

It may be noted that in April (1904) most plaice eggs were taken in waters with surface temperatures 2.50° to 6.55°; a few eggs, especially on the East Coast, were, however, taken in water with surface temperatures below 2.50°, down to 0.85°. In June (1924) the surface temperatures on stations where eggs were taken were

Fig. 4. Distribution of Plaice eggs in Icelandic waters in the month of June. R/S "Dana", June 2nd—9th, 1924. Silk net, 5 minute hauls. ● = 1—15 eggs, + = no eggs taken. The isotherms at a depth of about 50 metres are indicated.

2.19° to 5.29°, i.e. only about $^1/_3$—$1^1/_4$° below the temperature met with about $1^1/_2$ months earlier on the principal spawning places on the South and West Coast.

It will be seen, then, from the foregoing, that plaice eggs are numerous in South and West Iceland in April, but spawning also takes place here later in the year, as trawl catches from these waters in May, as late as the 20th of the month, still contain spawning plaice. We have, for instance, samples from May 19th and 20th, 1925, containing spawning fish, from Medallands Bay on the South Coast, and also from the waters off Snæfellsnes and outside Dýrafjord in West and North-west Iceland[1]). Spawning

[1]) Collections made by English and Scottish fish measurers.

plaice in small numbers have been met with a little later farther east on the South Coast (Ingólfshöfdi and Mýra Bay May 23rd—24th, 1904, and 1905), and on the East Coast spawning plaice occur still later in the summer judging from the find of pelagic eggs along this coast in the beginning of June. The plaice eggs taken in 1924 along the East Coast between June 2nd and 5th, were sometimes not more than about 7 days old[1]) others being near the hatching point. It may further be added that even as late as July 28th, pelagic fry were found in these waters (Hjeradsflói 1904) of 11—14 mm. length, and these stages could not be very old, as the larvæ are, according to hatching experiments made along this coast by the present writer in 1924, a little over 7 mm. long when hatched. In accordance with the statements above we have a record of spawning plaice in the north-eastern fjord Thistilfjord (Vidarvík) as late as the 25th of June (Gemzøe 1905, p. 276). On the other hand, investigations in the north-western fjords, of many hundreds of plaice in Arnarfjord, Ønundarfjord and Ísafjord, during the first part of June (June 3rd—17th, 1904) revealed no spawning plaice, only immature and spent fish being met with here.

On the North Coast also a certain amount of spawning takes place, according to Bjarni Sæmundsson (1926, p. 319—320), but little is known as to the conditions here prevailing.

A comparison of the state of things here outlined as for Icelandic waters with what is known from more southerly latitudes reveals a further instance of the well-known fact that the spawning season falls later in the year for spawning grounds lying further to the north; we find also, that within the Icelandic waters as a whole there is a difference in the time between one part and another, in accordance with the distribution of temperature in the sea. This will be clearly seen from the little table below compiled from various sources, *inter alia* works of A. Bowman, G. Brook, H. J. Buchanan-Wollaston, J. T. Cunningham, E. Ehrenbaum, T. W. Fulton, A. C. Johansen, W. C. McIntosh & A. T. Masterman, C. G. Johs. Petersen, S. Strodtmann, Bj. Sæmundsson, F. Trybom.

[7].

Spawning season for Plaice in	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sep.
Kattegat, Belts and Baltic*)	(+)	+	(+)	(+)	+	+	(+)	(+)	..	..	..	..
North Sea**)	..	(+)	+	+	+	+	(+)	+	(+)	..	..	..
South-West Iceland	..	..	..	..	+	+	+	(+)	(+)?	..	..	..
(North)-East Iceland	..	..	..	..	..	?	+	+	+	(+)?	..	..

The large crosses indicate principal spawning season, from which there is a falling off to either side, denoted by smaller crosses and brackets.

*) Strodtmann (1906 p. 180) mentions that a ripe female plaice has been found in the month of August in the Bornholm Deep.
**) Holt (1893 p. 78) states that the principal spawning season for the West Coast of Ireland falls in January, February and March (some spawning fish seen in April and August). Nordgaard (1913 p. 34) states April as the principal season for the Trondhjem Fjord Area.

[1]) The determination is based partly on our own hatching experiments in these waters, partly on statements in A. C. Johansen & A. Krogh (1914) and Apstein: Die Bestimmung des Alters pelagisch lebender Fischeier (1909).

The foregoing observations may be briefly summed up as follows: Experience in Icelandic waters shows that the majority of the plaice spawn on the western part of the South Coast, and along the West Coast, but that there is also a slight amount of spawning on the North and East Coasts, and that the spawning here for the greater part takes place later than that on the South and West Coasts.

The late spawning period in Icelandic waters as compared with more southerly waters has a very great influence on the rate of growth of the plaice in its first year along most of the Icelandic coasts, as will be seen from the following pages.

The young fry are distributed round the coast by the aid of the current, and the main general movement of eggs and pelagic fry from the great spawning grounds in the south-west follows the anticyclonic current, the Irminger current, northward along the West Coast and thence eastward along the North Coast. It may be noted for instance, that in 1904, the pelagic fry in this current system were, during the period from June 2nd—27th, practically confined to the range between Brede Bay and Cape Nord; the number of pelagic fry taken in the pelagic nets, however, was in most hauls but small, only exceptionally rising to about 50 specimens per half-hour's haul with the customary pelagic implements. The partial lack of pelagic fry in the implements used is a common occurrence in all years and is doubtless due to the fact that the stages in question at the time when investigations have been carried out most regularly, i.e. in the months from June to August, keep mainly to the water layers near the bottom and are therefore not very frequently taken with the implements employed. But from the moment the postlarvæ have reached a stage of development at which they move to the bottom for good and all, and make their appearance in the shallow water close inshore, we are once more able to follow them and investigate certain features in their life-history; such investigations will be dealt with in the following pages.

2. The occurrence of the bottom stages of the 0-group.

In order to ascertain at what time the 0-group plaice move to the bottom, or rather, appear in the shallow water on different parts of the coast of Iceland, collections were made in different localities by means of the hand shove net or shrimp net. The investigations were made partly from research vessels in Icelandic waters throughout a number of years, partly by persons sent to particularly interesting localities with these and other collections in view.

The chart here given (Fig. 5, p. 18) shows the localities where fishing with the hand shove net was carried on. This implement has been used fairly regularly on the West Coast, at a couple of localities in Faxe Bay; on the North-west Coast it has been tried in 6 places, on the North Coast at 9 places, and on the East Coast at two. On the South Coast proper no such investigations were made; the coast here is rather inaccessible for boats from research vessels at sea, partly owing to the fact that it is very exposed and the breakers are often violent, partly also because boats may be suddenly cut off from the ship by heavy seas arising without warning, when the crews have to land and

seek shelter at the nearest human habitation, which may often be some days' journey away. Only in the Westmanna Isles off the South Coast has the hand shove net been used in the coastal waters along this long coast.

The hand shove net employed was furnished with a canvas bag; at times one of very fine-meshed net was used. With this implement, one, two or three men have worked along the foreshore, where the bottom was suitable for small plaice, and depth from about $^3/_4$ metre to 0 over a range of some extent; the number of hours worked was

Fig. 5. Localities where hand shove net has been used in Icelandic waters. 1 Heimaey (Westmanna Isles), 2 Havnefjord, 3 Akranes, 4 Patreksfjord, 5 Dýrafjord, 6 Ønundarfjord, 7 Ísafjord, 8 Adalvík, 9 Hornvík, 10 Reykjarfjord, 11 Skagastrand, 12 Skagafjord, 13 Haganesvík, 14 Siglufjord, 15 Hrísey, 16 Svalbardseyri, 17 Akureyri, 18 Húsavík, 19 Seydisfjord, 20 Eskifjord.

as a rule between 1 and 4. The time which could be spared for this special work, however, was often so restricted that the men working other implements, e.g. eel hand seine, along the shore for collecting the youngest year classes of food fishes generally, were instructed also, as opportunity offered, to use the hand shove net; and in such cases, the actual amount of time devoted to this could not be precisely stated. The cleanest possible sandy bottom was chosen in all cases, and in nearly all parts of the Icelandic waters this is of a black, rather coarse lava sand. In some localities, the nature of the bottom changes considerably from year to year from good sandy bottom to a rather stony type, and the work carried out is therefore not always comparable as from one year to another; where it was of the more casual kind, any quantitative comparison is of course out of the question.

The following Table [8] shows the material collected in the course of this work[1]). Each year is noted separately, with locality (cf. chart. Fig. 5), date, number of 0-group plaice, minimum and maximum length of same, as also the average length. Where possible also, the number of men × hours is stated, and the number of 0-group plaice per man-hour.

Plaice of this group were also taken occasionally in the eel hand seine; in some cases, these catches conveniently supplement the remaining material, which was taken with the hand shove net; they are therefore set out in Table [9] p. 20. Altogether, about 90 stations have been taken with the eel hand seine in Icelandic waters; only about half a score, however, yielded any material of 0-group plaice, which of course easily slip through the mesh.

[8]. Number, Size etc. of 0-group Plaice taken with Hand shove net.

Locality and no. of station	Date	Number	Length	Aver. length	Men × hours	No. per hour
	1903					
Eskifjord (55)	28/V	0	..	..	..	..
Ønundarfjord (132)	15/VI	0	..	..	..	..
Heimaey (174)	18/VII	3	?	?	..	..
Seydisfjord	20/IX	12	2—2½ cm.	abt. 2.2 cm.	..	..
Húsavík	26/IX—1/X	20	2—5 cm.	abt. 3.3 cm.	..	..
	1904					
Seydisfjord (39)	26/IV	0	..	..	..	..
Húsavík (127)	31/V	0	..	..	..	..
Ønundarfjord (135)	3—11/VI	0	..	..	..	..
Akranes (168)	30/VI—1/VII	44	11—28 mm.	18.32 mm.	..	..
Havnefjord (172)	5—7/VII	98	14—26 mm.	20. 01 mm.	..	..
Heimaey (192)	16/VII	0	..	..	..	..
Seydisfjord (199)	19/VII	0	..	..	..	..
Húsavík (206)	21/VII	336	12—22 mm.	16.39 mm.	6	56
Seydisfjord (246)	9/VIII	0	..	..	..	..
Siglufjord (260)	15/VIII	345	17—44 mm.	30.37 mm.	1	345
Reykjarfjord (264)	23/VIII	0	..	..	..	..
Hornvík (268)	24/VIII	15	22—36 mm.	28.53 mm.	1	15
Ønundarfjord (270)	25/VIII	69	23—37 mm.	29.20 mm.	1	69
Patreksfjord (271)	26/VIII	81	20—37 mm.	27.10 mm.	..	..
Havnefjord (276)	29/VIII	32	31—50 mm.	39.72 mm.	1	32
	1905					
Seydisfjord (49)	22/V	0	..	..	..	..
Seydisfjord (135)	27/VII	0	..	..	..	..
Húsavík (145)	31/VII	0*)	..	..	..	..
Skagafjord (149)	12-21/VIII	1	2½ cm.	2½ cm.	..	..
	1908					
Havnefjord (36)	19-20/VI	0	..	..	..	..
Akranes (38)	25/VI	0	..	..	..	..

*) See table [9] and p. 27.

[1]) For details as to measurements see Appendix Table I.

8] continued.

Locality and no. of station	Date	Number	Length	Aver. length	Men × hours	No. per hour
	1909					
Seydisfjord	4/IX—20/IX	103	15—41 mm.	28.49 mm.	..	..
	1924					
Patreksfjord (2115)	7/VI	0	..	..	..	..
Akranes (2146)	29-30/VI	0	..	..	..	..
Adalvík (2162)	2/VII	0	..	..	..	..
Ísafjord (2166)	4/VII	0	..	..	..	..
Patreksfjord (2167)	4-5/VII	2	19—20 mm.	19.50 mm.	3	< 1
Ønundarfjord (2183)	17-18/VII	1276*)	10—29 mm.	20.27 mm.	$47^1/_2$	27
Húsavík (2206)	26/VII	0	..	..	..	..
	1925					
Akranes (2448)	8/VIII	3	30—32 mm.	31.00 mm.	3	1
	1926					
Patreksfjord (2695)	3/VII	0	..	..	..	..
Skagastrand (2762)	12/VII	236	12—25 mm.	16.51 mm.	..	..
Húsavík (2795)	16-17/VII	0	..	..	..	..
Haganesvík (2838)	20/VII	5	18—25 mm.	22.00 mm.	4	1
Siglufjord (2858)	21/VII	99	16—35 mm.	23.35 mm.	..	..
Akureyri (2862)	23/VII	0	..	..	..	..
Hrísey (2864)	24/VII	57	14—29 mm.	19.23 mm.	..	..
Reykjarfjord (2891)	25-26/VII	91	13—25 mm.	17.48 mm.	..	..
Siglufjord (2921)	29/VII	61	14—35 mm.	23.75 mm.	4	15
Húsavík (2934)	31/VII	4	18—28 mm.	23.50 mm.	2	2
	1927					
Seydisfjord (3085)	12/VII	0	..	..	..	..
Heimaey (3158)	30/VII	0	..	..	..	..
Akranes (3180)	2-3/VIII	0	..	..	..	..
Dýrafjord (3217)	7/VIII	188	20—43 mm.	29.24 mm.	3	63
Hrísey (3249)	12/VIII	12	24—49 mm.	38.00 mm.	4	3
Svalbardseyri (3253)	14/VIII	0	..	..	..	..
Húsavík (3264)	16/VIII	446	18—54 mm.	32.75 mm.	3	149
Seydisfjord (3287)	18/VIII	0	..	..	..	..

*) 690 specimens measured.

[9]. Number, Size etc. of 0-group Plaice taken in Eel hand seine.

Locality and no. of station	Date	Number	Length	Aver. length
Hornvík (286)	24/VIII, 1904	28	23—35 mm.	29.18 mm.
Húsavík (145)	31/VII, 1905	13	14—29 mm.	20.85 mm.
Siglufjord (148)	8/VIII, 1905	51	18—40 mm.	26.71 mm.
Havnefjord (49)	6/VII, 1908	1	29 mm.	29.00 mm.
Patreksfjord (58)	13/VII, 1908	33	10—24 mm.	16.48 mm.
Húsavík (74)	24/VII, 1908	27	1—2 cm.	..
Akranes (2448)	8/VIII, 1925	1	28 mm.	28.00 mm.
Reykjarfjord (2891)	25-26/VII, 1926	1	2 cm.	..
Havnefjord (3129)	28/VII, 1927	2	34—39 mm.	36.50 mm.
Akranes (3180)	2-3/VIII, 1927	2	31—34 mm.	32.50 mm.

Before proceeding to further consideration of the 0-group, we must here interpolate a brief observation as to the size of the I-group in relation to the 0-group. In Icelandic waters, I-group plaice are, in June-July (or later) so small on the whole that one might often be tempted to regard them as large

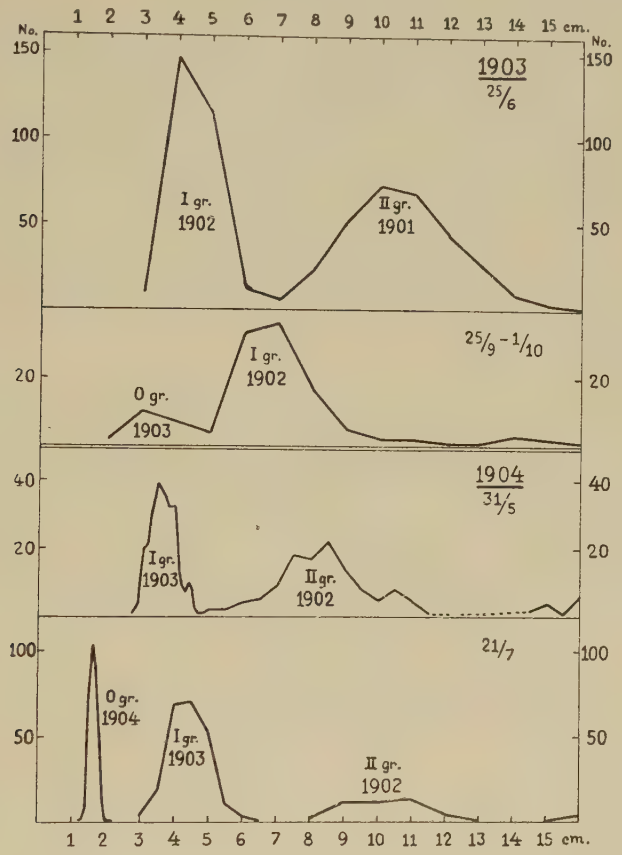


Fig. 6. Diagram illustrating composition of catches taken with eel hand seine and hand shove net at different seasons 1903 and 1904 in coastal waters on the North Coast (Húsavík); some few specimens over 16 cm. omitted.

specimens of the 0-group. Otolith determinations in 1924—27, however, have shown where the boundary between the two groups lies. The minimum sizes of the I-group are given below, and may be compared with the maximum values for the 0-group by consulting Table [8].

From South Iceland no observations are available, but judging from the size of the 0-group and the III-group the size of the I-group plaice will in the western part of the South Coast far exceed the size on the other coasts (cf. Fig. 7, p. 30).

In Faxe Bay, the smallest specimens of the I-group in June are as a rule 4—5 cm. long, but even smaller ones may be found; even about July 1st for instance, there

are nearly always some of this group still only $3^1/_2$ cm. long, and as late as August 1st a few may be met with down to 40 mm.

In North-west Iceland, the length of the smallest specimens in June is as a rule 3—4 cm.; about July 1st there are still a few down to $3^1/_2$ cm. but most are now over 4—5 cm. long.

In North Iceland, the smallest specimens about June 1st are about 3 cm. long (smallest 27 mm.); this size is also recorded from end June and in July; I-group fish of 3—$6^1/_2$ cm. were numerous for instance on July 21st, 1904; and on July 26th, 1924, specimens of the I-group were met with down to $3^1/_2$ cm. length; in this part of the Icelandic waters, growth does not proceed with any rapidity until July has set in. The accompanying curve (Fig. 6, p. 21) for 1903—1904, shows how closely the 0- and I-groups follow one after the other in North Iceland.

In East Iceland, the smallest specimens of the I-group at the end of May were $3^1/_4$ cm. long, and some way on in July they measured 4 cm., but there is no great amount of material available from here.

The occurrence of the 0-group in the bottom stages has never been noted at all in Icelandic waters before the very end of June; no mention will therefore be made in the following of the vain attempts to find them earlier (see Table [8]). In more southerly waters, as we know, the first stages of the 0-group appear close inshore from 1 to 2 months earlier; A. C. Johansen (1912, p. 14) for instance notes April 30th as the earliest date for finds of these small stages in the inner Danish waters. E. Ehrenbaum (1911, p. 8 f.) says that the metamorphosis of plaice-larvæ in the North Sea is completed at the end of May, i.e. about a month before the very first small bottom-stage has been met with in Icelandic waters.

From South Iceland we have no observations from June or earlier; in July the 0-group has been found.

Investigations along the West and North-west Coast of Iceland give the earliest occurrence of the first bottom stages of the 0-group in coastal waters as June 30th, July 1st and the days immediately following; the first occurrence in Faxe Bay was a little earlier than farther north, viz. June 30th as against July 4th (Patreksfjord). It is likely, however, that the 0-group will be found somewhat earlier in the Faxe Bay area, as the stages taken on June 30th—July 1st were of such a size as to suggest that investigations at suitable spots would have given an earlier date for the first occurrence in Faxe Bay.

In Faxe Bay, negative results were recorded twice in the last third of June; on all other occasions, after July 1st, young plaice were taken, if not in the hand shove net then in the eel seine.

In the North-west Fjords, three experiments in June gave negative results, and three out of four in the first third of July (July 2nd—3rd) were negative, only one, (July 4th) positive; all experiments made after July 13th gave positive results.

On the North Coast, the earliest find of the first bottom stages was made on the July 12th, in the westernmost of the great open bays (Hunaflói); farther to the east,

they were met with from July 21st onwards. During the period from July 11th—20th, two out of a total of three experiments were positive, and from July 20th to the end of the month, 6 positive out of 8 in all; in August, 4 positive out of six in these waters. As will be seen from the lists, there is a lack of investigations on the North Coast in the first half of July, which will have to be filled up in course of time, so that we can determine more exactly the date of first occurrence of these stages here. It has been noted in the foregoing that alterations in the condition of the bottom from year to year may account for these stages not being taken at times where one would expect to find them, but on this coast we must also be prepared to find, in some years, a very poor supply of young fry, owing to conditions of current. The small bottom stages have been met with as late as about October 1st close inshore at Húsavík (1903); they had, it is true, buried themselves in the sand, but as the sea was very rough at the time it may have been due to this, and not to the lateness of the season.

On the East Coast, in July and August (up to the 18th) five experiments were made, but the 0-group was never found on the grounds investigated in the fjords at this time; from August 18th to September 4th no observations are available, but bottom stages of the 0-group were found here (1903 and 1909) between September 4th and 20th. Judging from the sizes (about 15 to about 40 mm.), the smallest representatives of these stages could only have reached the coast a very short time before. It is thus presumably about September 1st that the 0-group appears on the East Coast, i.e. about two months later than on the West Coast. It should be pointed out, however, that the investigations with the hand shove net were made up in the fjords on the East Coast, and that investigations in the open bays (e.g. Hjeradsflói) might give an earlier date for the first occurrence of the 0-group in the coastal water.

Where these stages first saw the light we are as yet unable to say with certainty; they may have been brought to the East Coast by the anticyclonic current from the West via the North Coast, but they might also, from the small numbers in which they were found, have been spawned on the East Coast (see p. 13 f. and Fig. 4) and finally, it should be added that little is known in detail as to the conditions of the currents on this coast, especially as regards the interchange between the water layers of the South-east and East Coasts close to the bottom, where we should expect to find the latest pelagic stages of this species. Most probably the supply of these stages on the East Coast has its origin from different places in different years, and presumably also an intermingling of stages from different places may occur in some or all years.

The data for the occurrence for the 0-group on the coasts of Iceland are clearly set forth in Table [10] p. 24-25. In addition to the hand shove net samples, the table also includes some taken with the eel hand seine, which fill up certain gaps e.g. in the material for average length. The average length for the different localities shows a fairly steady increase from the first to the last samples taken. The figures are, however, from a number of different years, and the average lengths thus arrived at must be considered with due reserve. It must be borne in mind for instance, that the velocity of the current which carries the pelagic stages round the North Coast may vary from year to year, and that the 0-group of a certain size may thus be carried more rapidly (earlier)

[10]. Average length o

	South Iceland	West Iceland		North-west Icel		
	Heimaey[2])	Havnefjord	Akranes	Patreksfjord	Dýrafjord	
June 21th—30th..	.....	.....	30/VI: $A_{41} = 18.32$			
July 1st—10th ...	.....	6/VII: $A_{98} = 20.01$	.....	4—5/VII: $A_2 = 19.50$		
July 11th—20th..	.....	.....	.....	(13/VII: $A_{33} = 16.48$)	.....	
July 21st—31st...	$A_{606} = 32.15$	(28/VII: $A_2 = 36.50$)	.....	.....	.....	
— — ...	.....	.....	.....	.....	.....	
August 1st—10th..	.....	.....	8/VIII: $A_3 = 31.00$	.....	7/VIII: $A_{188} = 29.24$	
August 11th—20th	.....	.....	.....	.....	.....	
August 21th—31st.	.....	29/VIII: $A_{32} = 39.72$	.....	25/VIII: $A_{81} = 27.10$	.....	
September	.....	.....	.....	.....	.....	
—	.....	.....	.....	.....	.....	

[1]) Some average lengths from samples taken in the Eel hand seine are also given (in brackets). For further information as to t
[2]) A. C. Johansen 1903 p. 230. 3) Cf. p. 27, sample from July 31st 1905.

or more slowly (later) to such places as Skagastrand and Húsavík on the North Coast. And further, we must remember that purely local conditions determine the rate of growth also in these very young stages; we find, for instance, on the much-frequented ground at Akranes in Faxe Bay, a slower rate of growth that we should expect here; this is most clearly shown by the fact that the I-group here is of small size.

The material from samples containing stages less than about 17 mm. can as a rule be divided into two groups:—

A) comprising those which have entered upon the bottom stage but have as yet hardly completed their metamorphosis; these young specimens are as a rule still very slightly pigmented; the area on the upper side covering the stomach etc. does not yet appear as a distinctly darker part; furthermore, this group, though of course merging by transition stages into the next, is distinguished by the fact that the eyes

Hand shove net)[1]).

	North Iceland				East Iceland
	Reykjarfjord	Skagastrand	Haganesvík & Siglufjord	Hrísey	Húsavík	Seydisfjord
	.....	12/VII: $A_{236} = 16.51$	20/VII: $A_5 = 22.00$			
	25/VII: $A_{91} = 17.48$	.....	21/VII: $A_{99} = 23.35$	24/VII: $A_{57} = 19.23$	21/VII: $A_{336} = 16.39$	
	.....	.....	29/VII: $A_{61} = 23.75$	.....	31/VII: $A_4 = 23.50$[3])	
	.....	.....	(8/VIII: $A_{51} = 26.71$)			
	.....	.....	15/VIII: $A_{345} = 30.37$	12/VIII: $A_{12} = 38.00$	16/VIII: $A_{446} = 32.75$	
53						
	.....	.....	.....	.....	26/IX—1/X: A_{20} = abt. 33mm.	4—20/IX: $A_{103} = 28.49$
	.....	.....	.....	.....	.....	20/IX: A_{12} = abt. 22mm.

rage length of 44 specimens, in mm.

are small, and the left eye not yet quite shifted round to the right side; the anterior margin of the dorsal fin is not yet advanced beyond the posterior margin of the eye, or at any rate but very slightly so.

B) comprising all the stages of the 0-group older than the A-stages; those which have recently completed their metamorphosis are as a rule highly pigmented, melanophores now appearing more abundantly between the touches of pigment characteristic of the postlarval and metamorphosis stages; the pigment is also spreading over head, stomach and fins; the left eye is now completely shifted round to the right side, and the eyes are distinctly larger than in the previous group; the anterior margin of the dorsal fin has advanced beyond the posterior margin of the eye, and is now often level with or extending beyond the middle of the eye.

On going through the samples taken with hand shove net in Icelandic waters we find that the not yet completely metamorphosed stages of the 0-group (the A-stages)

in the coastal area are of less than abt. 15 mm. length, most of them between 12 and 15 mm; a few may perhaps be 1—1½ mm. more or less than this, but it was impossible to determine with absolute accuracy, as all these stages were not measured separately immediately after capture throughout the long series of years covered by the investigations, and when preserved in formalin, or kept for some years, the specimens shrink to a varying degree, from about ⅓ to 1 mm. or a little over. The smallest specimens of the second group, the B-stages, are as a rule slightly larger than the A-stages, but we may find individual specimens of B as small as the smallest of the A-group.

The earliest and latest occurrence of the A-stages as bottom stages in the shallow coastal water will now be considered somewhat more closely, as it is precisely these very young stages which can most clearly fix the time of occurrence of the 0-group in the bottom stages along the coasts.

The material (see Table [11], p. 28) shows that the A-stages are only met with in July in samples from the coastal area of West and North Iceland; none of the samples taken here later in the year contained any of these stages. In East Iceland, as mentioned above (p. 16) pelagic postlarvæ of 11—14 mm. length were taken as late as July 28th, and as bottom stages (only of the B-group) are not recorded from here until September 4th (Seydisfjord) the A-stages must be present on the East Coast at the end of August, but possibly also a little earlier as well as a little later, judging from the finds of eggs and the size of the bottom stages taken on this coast.

It is also noticeable that in July, most of these not quite metamorphosed stages (A) were taken in North Iceland, the hand shove net catches from West and North-west Iceland during this month showing only about 1½—2 per cent. of these stages, whereas in North Iceland we find at least 10 per cent. The cause of this lies doubtless primarily in the fact that the Irminger Current transports the fry in great quantities to the North Coast, but also in the fact that in West Iceland, these stages would be met with more especially at the end of June and in the beginning of July, when no very close investigation of suitable localities was made on the West Coast; it is also to be noted that these youngest stages seem to be found primarily on the coasts where special depth and current conditions bring them in to proper shallow coastal water before metamorphosis to the B-stage is completed, viz. on the North Coast to the shores of the open bays, which are exposed to the eastward-going current (e.g. Skagastrand and Húsavík).

In some localities on the coasts of Iceland other investigations afford some information as to the time at which the youngest stages approach the shore in considerable numbers.

We may take first of all the investigations of the stomach content of a sample of *Salmo alpinus* (57 specimens 19—25 cm. long) taken on July 3rd 1924, in Hesteyrarfjord on the North-west Coast with the eel hand seine drawn from 12 metres' depth in to land. The little fjord in question lies near the mouth of the Ísafjord on its northern side. The stomach content of the salmon consisted for by far the greater part of fish larvæ among which were recognisable cod, coalfish, sea-scorpion, capelan, lumpsucker and plaice. The last-named were present in hundreds, most of them 11—12 mm. long, some larger, some perhaps a little smaller (these last would, however, of course have been

most affected by the stomach secretions, and accurate measurements cannot be given). There can be no question of confusion with dab larvæ, as staining and subsequent counting of the prehæmal vertebræ showed the characteristic plaice values; most of the stages had the left eye in the dorsal line or even farther round on the right side. At the same time (July 2nd) the hand shove net was tried in the open bay of Adalvík outside the fjord above mentioned, but no small plaice were taken. Twentyfour hours later, however, 2 specimens of the 0-group (19—20 mm.) were caught in Patreksfjord, which lies farther to the south. And finally, about a fortnight later (July 17th—18th) many 0-group stages about 11—29 mm. long (average 20.3 mm.) were taken in the Ønundarfjord, a little south of the Ísafjord; only about $1^1/_2$ per cent., however, belonged to the not yet metamorphosed bottom stage (A).

These observations thus clearly show that during the year in question, the stages of the 0-group made the land in North-west Iceland in the first half of July, about July 3rd—17th.

In Skjálfandi Bay, and especially along the shore near Húsavík, 0-group plaice have been sought for fairly regularly in the latter half of July during the years when investigations were in progress in Icelandic waters. The earliest date recorded here for the finding of 0-group plaice is July 21st (in 1904), but experiments later in the month have in certain years given negative results (e.g. July 26th, 1924); it is thus likely that the time when the small plaice first appear in the coastal zone varies somewhat, as is of course to be expected, owing to the variation in rate of current, temperature of the water etc. The following facts seem to confirm this. As will be seen from the lists, the 0-group stages taken here in the middle of August 1927 were large, from 18 to 54 mm, with an average length of 32.75 mm. This is very near the length attained by this group here during the first growth period in some years; a sample from May 31st, 1904, for instance, consisting of 386 specimens taken in the eel hand seine consisted of I-group fish from 27—48 mm., and the average length of these was 36.43 mm., i.e. only about $3^1/_2$ mm. more than the average length of the group in question about $9^1/_2$ months earlier in some years. How late the not yet fully metamorphosed stages can be met with in these parts of the North Coast we do not know; they have been found in considerable numbers up to the July 31st (1905). On this date, a haul was made with the young-fish trawl with chain, in 6—7 metres of water, the trawl working along or near the sea bottom. A haul of 30 minutes' duration yielded about 80 specimens of the 0-group, of which 13 were hardly metamorphosed (A-stages); the average length for the whole sample was 15.41 mm. (from 12—21.5 mm., measured after preservation).

We have thus an interval of only about 10 days between the earliest and latest recorded occurrence of the very youngest bottom stages in Skjálfandi Bay; this will probably be extended somewhat by later investigations, but hardly so far as to equal the period embraced by the occurrence in more southerly waters (e.g. in the inner Danish waters, as noted by A. C. Johansen, 1912, p. 14: two months, viz. May—June).

The facts noted in the foregoing may be summed up as follows: The bottom

	South Iceland				We	
Locality.....	Heimaey (Westmanna Isles)				Havnefjord	
Date	16/VII 04	18/VII 03	22/VII 01 [1])	30/VII 27	19-20/VI 08	5-6/VII 04
Number of *A* & B stages	*0* 0	*0* 3	*0* 624	*0* 0	*0* 0	*1* 107

						N
Locality.....	Patreksfjord	Dýrafjord	Ønundarfjord			
Date	26/VIII 04	7/VIII 27	3-11/VI 04	15/VI 03	17-18/VII24 [2])	25/VIII 04
Number of *A* & B stages	*0* 81	*0* 188	*0* 0	*0* 0	*11* 679	*0* 69

Locality.....	Siglufjord		Hrísey [4])		Húsavík	
Date	29/VII 26	15/VIII 04	24/VII 26	12/VIII 27	31/V 04	16/VII 26
Number of *A* & B stages	*1* 59	*0* 345	*0* 57	*0* 12	*0* 0	*0* 0

	East Iceland					
Locality.....	Seydisfjord					
Date	19/VII 04	27/VII 05	9/VIII 04	18/VIII 27	4-20/IX 09	20/IX 03
Number of *A* & B stages	*0* 0	*0* 0	*0* 0	*0* 0	*0* 103	*0* 12

stages of the 0-group plaice occur on the coasts of Iceland earliest in the southern part of the West Coast waters, viz. about July 1st; on the northern part of the West Coast they are found some days, as a rule about 4—10, later; on the North Coast they appear more especially in the latter half of July, and finally, the East Coast receives its supply of these stages presumably about September 1st. No adequate observations are available from the South Coast, but the stages in question presumably appear here on the western part of the coast in the latter half of June, i.e. earlier than anywhere else in the Icelandic waters.

The order of precedence noted for localities round the coast of Iceland, both in regard to spawning season and appearance of the 0-group in the shallow

ges A and B.

				North-west Iceland		
	Akranes			Patreksfjord		
	29-30/VI 24	30/VI-1/VII 04	2-3/VIII 27	8/VIII 25	7/VI 24	3/VII 26	4-5/VII 24
	0	*2*	*0*	*0*	*0*	*0*	*0*
	0	43	0	3	0	0	2

				North Iceland			
	Hornvík	Reykjarfjord		Skagastrand	Skagafjord	Haganesvík	Siglufjord
	24/VIII 04	25/VII 26	23/VIII 04	12/VII 26	12-21/VIII 05	20/VII 26	21/VII 26
	0	*0*	*0*	*25*	*0*	*0*	*0*
	15	90	0	209	1	5	99

					East Iceland		
	Húsavík				Seydisfjord		
	31/VII 05 [6])	31/VII 26	16/VIII 27	26/IX-1/X 03	26/IV 04	22/V 05	12/VII 27
	0	*0*	*0*	*0*	*0*	*0*	*0*
	0	4	446	abt. 20	0	0	0

[1]) A. C. Johansen 1903 p. 230.

[2]) This sample numbered 1276 spec. in all, but only 690 were used for this investigation.

[3]) 0-group found simultaneously in stomach-contents of *Salmo alpinus*, see p. 26.

[4]) Hand shove net also used farther up in Eyjafjord, but no 0-group plaice were found.

[5]) The sample consisted of 336 fish, of which 240 are available for examination; 62 of these are plainly very young, but there are also no fewer than 83 at a stage between A and B which might equally well be ascribed to A as to B.

[6]) Both A and B stages were taken at the same time in the young-fish trawl with chain at a depth of 6—7 metres (see p. 27).

coastal waters, follows naturally from the conditions of temperature and currents prevailing in these waters. The hydrographical conditions are further discussed and variously illustrated by the works published during the last 25 years concerning investigations in these waters, and a brief summary is given in the present work p. 49 f.; we will not therefore go further into them here.

On comparing what has been stated in the foregoing as to size attained by the 0-group in North Iceland during the first growth period with the data from more southerly latitudes, it is at once apparent that the curtailment of the growth period by a couple of months makes an enormous difference.

Taking for instance a series of average lengths of the 0-group from the Baltic area (H. Blegvad, 1926, p. 17) we find here average lengths about August 1st (July 29th—

August 6th) of about 45—65 mm., which is approximately the length of the I-group at this season in North Iceland, the 0-group at the same time having an average length of only about 24—27 mm. In the North Sea we find that the 0-group plaice at this season also has an average length of about 55 mm. (40—70 mm.); cf. Fr. Heincke und H. Henking, 1907, p. 16, fig. 1, with figs. 6 and 7 in the present work.

It has been noted elsewhere that the growth in the western part of South Iceland is probably as rapid as on the best grounds anywhere within the area of distribution of the

Fig. 7. Diagram showing the sizes of bottom-stages of 0-group Plaice in two different places in Icelandic waters at the same season. — I. South-west Iceland, Westmanna Isles, July 22nd 1901. II. North-west Iceland, Ønundarfjord, July 16th—18th, 1924.

species (see p. 47); unfortunately, we have but a single sample of the 0-group from these waters, (A. C. Johansen, 1903, p. 230, and 1905, p. 5—6) but this shows that the growth here is considerably in advance of that recorded for North-west Iceland at the same season and is probably not below that in the North Sea. It will be seen from the curves Fig. 7, that the 0-group in South Iceland is considerably larger than in North-west Iceland at the same time of the year. This is most probably first of all due to the fact that the conditions of growth even as regards these youngest stages are better in South Iceland than in the colder parts of Icelandic waters, but probably the difference is also partly due to a difference in spawning time.

A decrease in the average sizes of the 0-group from the warmer to the colder coasts of Iceland is also clearly discernible in the Table [10] p. 24-25. It will therefore doubtless be found that Iceland's long and greatly varying range of coast presents, in regard to rate of growth of the 0-group during the first growth period, a gradual decrease from South-west Iceland both round to the West and North Coasts and eastward along the South Coast round to the East Coast, where in all probability the minimum growth will be found. Material from winter and early spring — earlier than growth sets in — is not available for elucidating this and other questions.

In the Icelandic waters, no very extensive use has been made of implements which could take the small 0-group bottom stages out in deeper water; we have, however, some catches which show that the first stages of the 0-group seek the bottom in deeper water; indeed, it is likely of course that the very great majority first take to the bottom in fairly deep water, moving in from there to shallower grounds. For the stages of the A-group, not yet fully metamorphosed, are relatively very scarce, and their appearance among the older stages, the B-group, seems within certain limits, to be rather accidental, as may easily be seen from Table [11], p. 28-29. This must, as mentioned, doubtless be due to the fact that only special conditions of current bring them in to the quite shallow water before they take to the bottom. The experiment already noted with the young-fish trawl with chain (p. 27) on July 31st, 1905, in Skájlfandi Bay shows that the youngest stages are numerous at depths from 6—7 metres. In 1904, as will be seen from the lists, several hundred specimens of the 0-group were taken on July 21st with the hand shove net at the same locality, along the shore, and on the same day, trawling was carried on at a depth of 17—21 metres out in the bay, and a few of these small 0-group plaice (14—17 mm. long) were found hanging in the meshes of the trawl, so that they must have been numerous out here as well. The stages in question must thus have been present here at least as far out as about 20 metres' depth.

As regards the numbers of 0-group plaice on the different coasts, the method of capture, with hand shove net, often casually employed in conjunction with other work proceeding at the same time, does not permit of any close analysis. The young plaice trawl used by A. C. Johansen[1]) has not been tried in Icelandic waters, and would hardly be suitable in many of the localities investigated, owing to the nature of the bottom, as the sandy stretches are often abundantly strewn with rocks and stones of more or less considerable size. We have, however, where permissible, worked out the number taken per hour by one man with the hand shove net; the figures are given in Table [8] p. 19. From these it will be seen that the number varies enormously, but at the same time it is noticeable that the highest values are found on the North Coast, though fairly high values are also recorded for the north-western fjords. In the great majority of cases, however, the yield is less than in more southerly parts of the area of distribution e.g. in the North Sea and the inner Danish waters, (see A. C. Johansen, 1908, p. 15 f.) though large catches have occassionally been made off the North Coast of Iceland. The numerous negative results recorded even at times when we should expect

[1]) Cf. A. C. Johansen 1922, p. 3.

to take the 0-group show that these stages, at any rate in certain years, are less numerous along the West and North Coasts than in more central parts of the area of distribution. This may be due partly to fluctuations in the actual quantity of young produced, partly to variations in the supplies brought by the currents to the West and North Coasts. Investigations on the South Coast, however, are urgently needed, and it is likely that the young plaice trawl may be of good service here.

V. The Stock of Plaice on feeding grounds in South, West, North and East Iceland.

The present part deals mainly with the age-composition and the rate of growth of the stock of plaice in Icelandic waters especially on the trawling grounds off the various coasts with depth about 10—50 metres, and with such questions as may be more or less elucidated by these investigations. The stock of plaice on fishing grounds off the south, west, north and east coasts of Iceland has been investigated. The total number of plaice subjected to age determination amounts to over 10,000, the usual otolith method being employed. In the great majority of cases, the otoliths had to be ground before age determination could be made with sufficient certainty. In the tables etc., the year-groups X and over have been taken together under one heading, X+; there is very little material from these older age-groups, and they are also difficult to determine with certainty. The oldest fish in the present material are at most about 17 years old. The oldest plaice I have seen up to now from Icelandic waters was about 20—25 years old; the otoliths were sent me by Fiskerikonsulent Bjarni Sæmundsson, and were from a fish taken off South-east Iceland May 13th, 1926, the length stated as 81 cm. It was a spent male taken at a depth of about 100 metres (Papagrunn). The largest specimen taken in Icelandic waters is said to have been 85 cm. long.

The material used for age determinations was all procured during the months of June, July and August. The "Dana" used throughout a small Otter Trawl (50′ Otter Trawl) with small mesh net at the cod-end. The "Explorer" used partly, and principally, the 60′ Commercial Otter Trawl, partly a 50′ Otter Trawl; small mesh net at the cod-end was employed. In southern Iceland, which is here of particular importance, the "Explorer" used the Commercial Trawl, not the small 50′ Trawl. The hauls were mostly of one hours' duration. In places where trawling was carried out for any length of time, hauls were made as far as possible at all times of the day and night, and the hauls so arranged as to cover the ground worked in different directions. In coastal waters the eel hand seine net has been used.

Finally, it must be pointed out that the material was not procured solely with a view to studying the biology of plaice in Icelandic waters; for the most part, several objects had to be considered, and it was not therefore always possible to make such particular arrangements as would have been desirable for a special study of the biology of a single species.

I. SOUTH AND EAST ICELAND.

Material.

Valuable material from this area was procured by the Fishery Board for Scotland on the cruise of the "Explorer" in 1925, under the leadership of Dr. Alex. Bowmann. During the period from June 27th to July 2nd, a series of trawling stations were taken on the South Coast with the Commercial Otter Trawl. The "Dana" also, in 1927, took a series of stations on the South and East Coasts, in July, with the 50′ Otter Trawl. The position of the most important stations will be seen from the charts Figs. 11 and 12, p. 44-45.

Below will be found a list of the "Explorer" stations in South Iceland waters with position etc., the number of plaice taken, and the bottom temperature at the respective stations being also noted. "i" denotes intraterritorial stations, the remainder of the stations being outside the territorial limit.

[12].

St.	Haul	Date *1925*	Position	Depth in metres	Duration of haul (hrs.)	No. of Plaice	Bottom-temperature
36	921	26/VI	63°48′ N. 23°05′ W. Off Reykjanes	148	1	0	6.73° (140 m.)
37	928	26/VI	63°40′ N. 22°48′ W.	158—170	½	0	6.94° (153 m.)
38	936	27/VI	63°44′ N. 21°35′ W.	114	½	1	7.08° (110 m.)
39	937	27/VI	63°19′ N. 20°48′ W. S.W. of Westmanna Isles	117	1	0	7.20° (120 m.)
40 i	944	27/VI	63°34′ N. 20°26′ W. Landeyjasandr	65	1	90	7.95° (60 m.)
„	951	28/VI	„	65	1	32	—
41	952	30/VI	63°18′ N. 20°05′ W.	176	½	0	7.26° (170 m.)
42	961	30/VI	63°20.5′ N. 19°52′ W.	184	½	0	—
43 i	962	30/VI	63°25′ N. 19°25′ W. Eyjafjallasandr	45	1	236	7.30° (40 m.)
44 i	971	1/VII	63°27′ N. 18°04′ W. Medallandssandr	97	1	0	7.19° (92 m.)
45	981	1/VII	63°38′ N. 17°11′ W. Medallands Bay	104	1	6	7.11° (100 m.)
46	989	1/VII	63°46′ N. 16°25′ W. Ingólfshøfdi	63	1	27	7.29° (60 m.)
47 i	998	1/VII	63°50′ N. 16°33′ W. Ingólfshøfdi	24	1	698	—
48 i	999	2/VII	64°13′ N. 15°28′ W. Mýra Bay	31	1	571	7.27° (35 m.)
49 i	1008	2/VII	64°20′ N. 14°39′ W. Lónsvík	39	1	327	5.33° (39 m.)
54	1025	2/VII	64°28′ N. 13°24′ W.	173	¼	0	6.82° (165 m.)

Appendix Tables II—VII show the figures for the material from the various stations. On the East Coast grounds, four trawl stations were taken by the "Explorer",

from June 11th—14th, but as these were at depths from 107—220 metres, practically no plaice were taken, and they will therefore not be further referred to here.

The "Dana" material from South Iceland was taken at the beginning and end of July 1927, the distribution being as follows:—

[13].

St.	Date *1927*	Position	Depth in metres	Duration of haul (hrs.)	No. of Plaice	Bottom-temperature
3066 i	6/VII	63°25′ N. 19°20′ W. Portland	20—48	4	65	10.33° (45 m.)
3069 i	7/VII	63°40′ N. 17°43′ W. Medallands Bay	20—60	$4^1/_2$	355	9.83° (20 m.)
3070	7/VII	63°37′ N. 17°39′ W. Medallands Bay	124	1	0	—
3071 i	8/VII	63°50′ N. 16°33′ W. Ingólfshøfdi	15—30	9	921[1])	9.39° (18 m.)
3072	8/VII	63°46′ N. 16°25′ W. Ingólfshøfdi	65	5	1	7.74° (60 m.)
3075 i	9/VII	64°20′ N. 14°39′ W. Lónsvík	36—43	3	102	7.10° (37 m.)
3156 i	30/VII	63°34′ N. 20°26′ W. Landeyjasandr	25—43	4	189	9.41° (32 m.)
3159 i	31/VII	63°16′ N. 20°30′ W. S.W. of Westmanna Isles	125	2	0	7.77° (120 m.)

[1]) Of these, 409 specimens determined as to age.

Appendix Tables VIII—XII show the figures for the material in question.

As will be shown in the following, East Iceland exhibits very similar conditions to those of the eastern part of the South Coast in regard to the stock of plaice in 1927, and it will be natural therefore here to mention the material from the East Coast. Only a few samples are available from these grounds:—

[14].

St.	Date *1927*	Position	Depth in metres	Duration of haul (hrs.)	No. of Plaice	Bottom-temperature
3089 i	12/VII	65°40′ N. 14°10′ W. Hjeradsflói	30—40	5	659	4.21° (33 m.)
3284 i	18/VIII	„	„	2	118	8.71° (40 m.)
3293	20/VIII	65°33′ N. 12°56′ W.	124—134	3	0	—

A sample of 362 specimens from St. 3089 (Hjeradsflói) was age-determined.

Here should also be added a small sample taken by the "Dana" in 1924 in the same part of East Iceland as St. 3089, Hjeradsflói.

[15].

St.	Date *1924*	Position	Depth in metres	Duration of haul (hrs.)	No. of Plaice	Bottom-temperature
2219 i	28/VII	65°39′ N. 14°08′ W. Hjeradsflói	14—15	1	94	—

Appendix Tables XIII—XIV show the figures for the material from Hjeradsflói.

Remarks on the material etc.

On the South Coast, as throughout the Icelandic waters and elsewhere, the plaice are far more numerous inside than outside the 50 metre line. A general survey of the catches made with the Commercial Otter Trawl by the "Explorer" in the south of Iceland shows the following features with regard to bathymetrical distribution in June 1925:

[16].

"Explorer"	South Iceland, June 1925
Depth in metres	No. pr. trawl hour[1])
< 20	..
20—50	*457.8* (4)
50—c. 100	*50.0* (3)
c. 100—c. 200	*1.2* (6)

[1]) No. of trawl hours noted in brackets. Commercial Trawl.

As will later be shown, the high figure per trawl hour in South Iceland at depths from 20—50 metres is due to an unusually dominant III-group; and here in South Iceland, in the still shallower water, where, however, no fishing was done in 1925, this group must be supposed to be considerably more numerous than out at 20—50 metres' depth. In the great majority of cases, and in most localities on this coast, it is of course too risky to work with research vessels of any considerable draught in water of 10—15 metres depth or less; consequently, only a little work was done with the Otter Trawl in shallow water on the South Coast of Iceland. In 1927 (when the III-group from 1925 was dominant as the V-group), the "Dana" was able to approach rather near to land, and obtained the following results with the 50′ Otter Trawl:—

[17].

"Dana"	South Iceland, July 1927
Depth in metres	No. pr. trawl hour[2])
15—30	*102.3* (9)
c. 30—50	*45.9* (15½)
c. 65	*0.2* (5)
c. 124—125	*0.0* (3)

[2]) No. of trawl hours noted in brackets. 50′ Otter Trawl.

From this then, it seems that in South Iceland, the plaice were, in 1925, owing to the overwhelming numbers of the III-group, fairly numerous also out between the 50 and 100 metre limits, whereas in 1927, where trawling was carried out during that year, they were but sparsely represented outside the 50 metre line.

The list on p. 33 gives us the following figures for catch per trawl hour from west to east at the intraterritorial stations along the South Coast in 1925 ("Explorer"):

[18].

Landeyjasandr	Eyjafjallasandr	Medallandssandr	Ingólfshofdi	Mýra Bay	Lónsvík
St. 40	St. 43	St. 44	St. 47	St. 48	St. 49
(65 m.)	(45 m.)	(97 m.)	(24 m.)	(31 m.)	(39 m.)
61.5	*236.0*	*0.0*	*697.0*	*571.0*	*327.0*

In 1927, the "Dana" was working a series of similar grounds, and from the list p. 34 we obtain the following catches per trawl hour for these:—

[19].

Landeyjasandr	Portland	Medallands Bay	Ingólfshøfdi	Lónsvík
St. 3156	St. 3066	St. 3069	St. 3071	St. 3075
(25—43 m.)	(20—48 m.)	(20—60 m.)	(15—30 m.)	(36—43 m.)
46.8	*16.3*	*79.3*	*102.3*	*34.0*

Some of the South Iceland grounds are especially rich in plaice; this applies, according to the trawling done, more especially to the neighbourhood of Ingólfshøfdi; but large quantities of plaice may also be met with in the intraterritorial waters farther west. Here, as elsewhere, the density doubtless varies altogether largely according to purely local conditions, and the present material is therefore naturally too small to serve for further investigation of the density question, especially also, as the catches above noted are already affected by the different depths from which they are procured.

In East Iceland, in 1927, mid July, we have 131.8 plaice per trawl hour from Hjeradsflói, depth 30—40 metres; in the middle of August, on the same grounds, two hours' trawling yielded only 59.0 per trawl hour. This trawling ground in the East Iceland waters thus proves to be as thickly populated as the best of those on the South Coast, despite the fact that no extensive spawning takes place in East Iceland waters, the supply there being mainly due to transportation by the current or by migration (of pelagic fry and older stages respectively). The difference observed in the catches for the two months suggests a migration seaward or shoreward in the course of the summer (the temperature had risen about $4^1/_2{}^\circ$ in the two months). In 1924 also, at Hjeradsflói 14—15 metres depth, a single trawling haul was made, lasting 1 hour (July 28th). This yielded 94 plaice, and the ground in question thus seems, for this year as well, to be among the best stocked in Iceland.

As already apparent from the lists p. 33-34, showing the stations inside the territorial limit marked "i", the catches made inside this limit considerably exceed those from outside. In South Iceland, however, there are only a few grounds with depth less than 50 metres outside the territorial limit[1]), and these are of very restricted extent. Direct comparison between the density inside and that outside the territorial limit is therefore here difficult and of little value. The numerous trawlers which are always at work along this coast are, however, undoubtedly largely responsible for the fact that the density outside is less than that inside the territorial limit. This was plainly apparent from the results of the "Dana"'s work at Ingólfshøfdi in 1927, when 5 hours' trawling outside the limit, at a depth of about 65 metres, yielded but a single plaice, whereas 9 hours trawling inside the limit, though, it is true, in only 15—30 metres of water, yielded 921. There were about 27 trawlers at work outside the territorial limit at the time.

[1]) e.g. at Rangársandr, north of the Westmanna Isles, at Ingólfshøfdi, in Mýra Bay, S. and E. of Eystra Horn.

Numerical proportion of sexes.

The numerical proportion of the two sexes varies somewhat from place to place, as will be seen from Appendix Tables II—XII, but the fluctuations are not very great on the whole. Taking the material from South Iceland under one head, we find the following figures for female and male in the intraterritorial waters:—

[20].

		Female	Male	Total
"Explorer" 1925:	Number	915	1039	1954
	Percentage.....	*46.8*	*53.2*	*100*
"Dana" 1927:	Number	772	860	1632
	Percentage.....	*47.9*	*52.1*	*100*

We have thus, in South Iceland, on the trawling grounds investigated, a slightly higher percentage of males than of females; in the two years 1925 and 1927 the proportion between the two sexes is almost the same, but with a slight drop in the percentage of males for 1927. It should here be observed, however, that the majority of plaice both in 1925 and 1927 belonged to the 1922 year-class, and that the slight fall in the number of males may possibly be due to migration, in conjunction with the earlier attainment of maturity on the part of the males.

Age-composition and fluctuations.

Examination of the material from South Iceland 1925 revealed the surprising fact of a single age-group dominating to such an extent that nearly 80 per cent. of the entire material from this year falls to the year-class 1922. This will be seen, firstly from Appendix Tables II—VII, and further from the accompanying survey p. 38, which shows the numbers and percentages of the different year-classes for the principal stations, as also for the whole of South Iceland taken together. Only material from less than 65 m. depth is here considered, there being practically nothing to speak of from the deeper stations; the same applies to the material from 1927.

It will be seen from the Table [21] p. 38 that in 1925, besides the 1922 year-class (the III-group), only the 1921 year-class (the IV-group) was present in any quantity, none of the other year-classes exceeding 2 per cent. of the total material from South Iceland. The strength of the III-group varies from about 56 per cent. to about 97 per cent. It is very interesting to note that at a depth of 24 metres at Ingólfshøfdi, the stock consisted almost exclusively of the III-group, which made up no less than 97 per cent. of the catch. One or two of the samples contained some fish of year-classes older than the 1921; this is especially the case with the sample from Landeyjasandr, where we have a depth of 65 metres or thereabout; this sample contained about 20 per cent. of the older year-classes (V—VIII gr.). Fig. 8 shows the two extreme samples from South Iceland in 1925 and 1927; despite a difference of some 20 metres in the depth, the difference in the curves for the two localities is not so great as might be expected.

[21]. Number and percentage of the different age-groups.
South Iceland 1925.

Age-group / Year-class	II 1923	III 1922	IV 1921	V 1920	VI 1919	VII 1918	VIII 1917	IX 1916	X+ 1915÷	Indet.	Totals
Landeyjasandr. St. 40.	..	64	27	6	7	2	6	..	1	9	122
	..	*56.6*	*23.9*	*5.3*	*6.2*	*1.8*	*5.3*	..	*0.9*		
Eyjafjallasandr. St. 43.	..	211	14	3	3	..	..	1	..	4	236
	..	*91.0*	*6.0*	*1.3*	*1.3*	..	..	*0.4*	..		
Ingólfshøfdi, intra. St. 47	..	671	17	2	..	..	..	..	..	8	698
	..	*97.2*	*2.5*	*0.3*	..	..	..	..	..		
Ingólfshøfdi, extra. St. 46	..	19	4	..	..	..	..	..	1	3	27
	..	*79.2*	*16.7*	..	..	..	..	..	*4.1*		
Mýra-Bay. St. 48	..	361	168	7	3	5	2	4	7	14	571
	..	*64.8*	*30.2*	*1.5*	*0.5*	*0.9*	*0.4*	*0.7*	*1.2*		
Lónsvík. St. 49	..	190	117	9	..	..	1	1	..	9	327
	..	*59.8*	*36.8*	*2.8*	..	..	*0.3*	*0.3*	..		
Totals, South Iceland	..	1516	347	27	13	7	9	6	9	47	1981
	..	*78.4*	*18.0*	*1.4*	*0.7*	*0.4*	*0.4*	*0.3*	*0.4*		

[22]. Number and percentage of the different age-groups,
South and East Iceland 1927.

Age-group / Year-class	II 1925	III 1924	IV 1923	V 1922	VI 1921	VII 1920	VIII 1919	IX 1918	X+ 1917÷	Indet.	Totals
Landeyjasandr. St. 3156	..	35	26	96	17	6	3	1	..	5	189
	..	*19.0*	*14.1*	*52.2*	*9.2*	*3.3*	*1.6*	*0.6*	..		
Portland. St. 3066	..	6	12	35	3	4	..	..	4	1	65
	..	*9.4*	*18.8*	*54.7*	*4.7*	*6.2*	..	..	*6.2*		
Medallands Bay. St. 3069	1	105	13	217	11	2	..	..	..	6	355
	0.3	*30.1*	*3.7*	*62.2*	*3.1*	*0.6*	..	..	..		
Ingólfshøfdi[1]). St. 3071	..	43	33	296	17	4	..	..	..	16	409
	..	*11.0*	*8.4*	*75.3*	*4.3*	*1.0*	..	..	..		
Lónsvík. St. 3075	..	..	2	78	13	2	2	..	5	0	102
	..	..	*1.9*	*76.5*	*12.8*	*1.9*	*1.9*	..	*4.9*		
Totals, South Iceland	1	189	86	722	61	18	5	1	9	28	1120
	0.1	*17.3*	*7.9*	*66.1*	*5.6*	*1.7*	*0.4*	*0.1*	*0.8*		
Hjeradsflói[2]). East I. St. 3089	..	1	7	272	50	7	1	..	..	24	362
	..	*0.3*	*2.1*	*80.4*	*14.8*	*2.1*	*0.3*	..	..		

[1]) The total no. of specimens taken at this intraterritorial station was 921; outside the territorial limit, only one plaice was taken (II-gr.).

[2]) Total no. of specimens taken 659.

In 1927 also, the 1922 year-class, now the V-group, is absolutely dominant; the Table [22] above, and Appendix Tables VIII-XII show the numerical proportions of the different age-groups at a series of stations corresponding fairly well as regards depth and position to the material from 1925; the stations at Landeyjasandr, Ingólfshøfdi and Lónsvík were taken at practically the same spot in both years.

The V-group (the 1922 year-class) makes up, in 1927, 66 per cent. of the entire material; the strength of the group varies in the different samples from

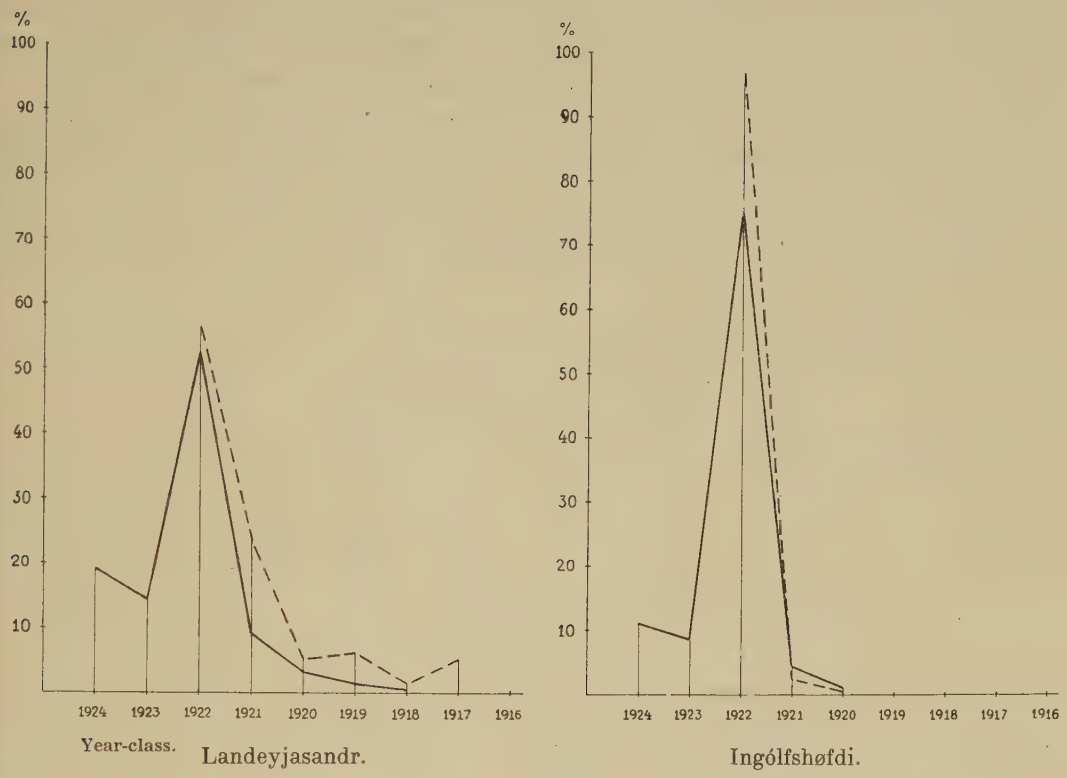


Fig. 8. Diagram showing percentages of the different year-classes in two places off the South Coast.
– – – – 1925. ——— 1927.

about 52 per cent. to about 76 per cent. The slightly inferior strength of the V-group in 1927 as compared with the III-group in 1925 lies, not in any greater number of fish of the older age-groups (VI and over) caught in 1927 but almost exclusively in the fact that a new III-group (the 1924 year-class) is evidently of considerable strength. This is most distinctly shown in the material from Medallands Bay, where, in 20—60 metres of water the III-group was found to constitute about 30 per cent. of the stock. The V-group, in 1927, increases its percentage as we move along the South Coast round to the East; the III-group on the other hand, and also the IV-group, decreases in the same direction. This is probably due to that the transport of pelagic fry to the East Coast was less in 1923 and 1924 (?) than in 1922; in 1924 on the other hand, there was considerable transportation round to the North Coast (see Fig. 21 p. 76).

The graph Fig. 9 shows the percentage composition of the year-classes from South Iceland for the years 1925 and 1927; this graph recapitulates clearly and distinctly what has been said in the foregoing and needs no further explanation. Finally, we must here again refer to Fig. 8, where the curves for 1927 are drawn together with those for 1925 for the two stations at Landeyjasandr and Ingólfshøfdi. This shows, among other features, how slight is the effect on the percentage of the different year-classes in the

stock produced by the lapse of two years at these stations. Much the same also applies to the material from the stations at Lónsvík, which, like those just mentioned, were taken at practically the same spot in 1925 as in 1927. All this can only be interpreted as indicating that the 1922 year-class must have been exceptionally dominant and the stock of plaice to a high degree stationary on the different localities investigated along the South Coast.

Nowhere else in Icelandic waters do we find, in 1925, the III-group

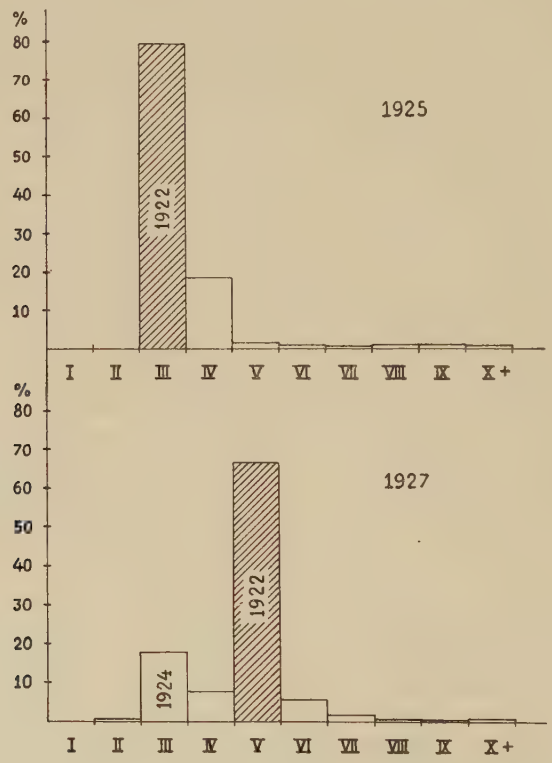


Fig. 9. Percentages of the different age-groups in 1925 and 1927 on the South Coast (including all material).

so numerously represented out at depths of 25—50 metres or more; the cause must doubtless lie mainly in the fact that this year-class, from its very numbers, was forced to spread, also out towards the deeper water. A contributory factor, however, is probably the intensive trawling on the South Coast, which, by taking the older fish from the outer grounds, enables the younger ones to exist there when the inner grounds become so overcrowded as was evidently the case in 1925.

From East Iceland we have only material for 1924 and 1927, from Hjeradsflói (see p. 34). Comparison of the material for 1927 (see Table [22] p. 38, and Appendix Table XIV) with that from South Iceland shows close agreement both in regard to

[23]. Numbers per trawl hour of the different year-classes in 1925 ("Explorer", 60′ Otter Trawl).

	Total no. per trawl hour	Year class 1915÷	1916	1917	1918	1919	1920	1921	1922	1923
Landeyjasandr (St. 40)	61	<1	..	3	1	4	3	14	*32*	..
Eyjafjallasandr (St. 43)	236	..	1	..	..	3	3	14	*211*	..
Ingólfshøfdi (St. 47)	698	..	..	..	..	..	2	17	*671*	..
Mýra Bay (St. 48)	571	7	4	2	5	3	7	168	*361*	..
Lónsvík (St. 49)	327	..	1	1	..	..	9	117	*190*	..

[24]. Numbers per trawl hour of the different year-classes in 1927 ("Dana", 50′ Otter Trawl).

	Total no. per trawl hour	Year class 1917÷	1918	1919	1920	1921	1922	1923	1924	1925
Landeyjasandr (St. 3156)	47	..	<1	<1	1	4	*24*	6	9	..
Portland (St. 3066)	16	1	..	..	1	1	*9*	3	1	..
Medallands Bay (St. 3069)	79	..	..	..	<1	2	*48*	3	23	<1
Ingólfshøfdi (St. 3071)	102	..	..	..	<1	4	*77*	9	11	..
Lónsvík (St. 3075)	34	1	..	1	1	4	*26*	1	..	..
Hjeradsflói (St. 3089)	130	..	..	<1	3	19	*104*	3	<1	..

age-composition and relative size of the dominant 1922 year-class; more precisely, the material is in these respects almost identical with that from Lónsvík, at the boundary between South and East Iceland. The Tables [22] and [24] on p. 38 and above, also show that the relative composition, though not the absolute quantity per trawl hour, is the same for Lónsvík as for Hjeradsflói, the actual figures being four times as high at the latter as at the former locality. Fig. 10 shows the striking similarity between the material from the two localities, and we can therefore here assert that in 1927, the age-composition on the somewhat northerly East Iceland trawling ground was the same as that found at the south-eastern point of Iceland. As we shall see later on, there is no absolutely abrupt transition in rate of growth etc., from the stock on the eastern part of the South Coast to that of the East Coast itself.

A small sample from East Iceland 1924, the only trawl catch from East and South Iceland in that year, shows one or two interesting features (see also Appendix Table XIII).

[25]. Hjeradsflói 1924.

Age-group	II	III	IV	V	VI	VII	Indet.	Total
Year-class	1922	1921	1920	1919	1918	1917		
Number[1]	5	16	30	13	14	2	14	94
Percentage	*6.3*	*20.0*	*37.5*	*16.3*	*17.5*	*2.5*		

[1]) and number per trawl hour.

In the whole of the material dealt with in the present paper, comprising about 10,000 plaice from all round the coasts of Iceland, we have only found very few specimens of the II-group at depths corresponding to these; in the samples from Hjeradsflói 1924,

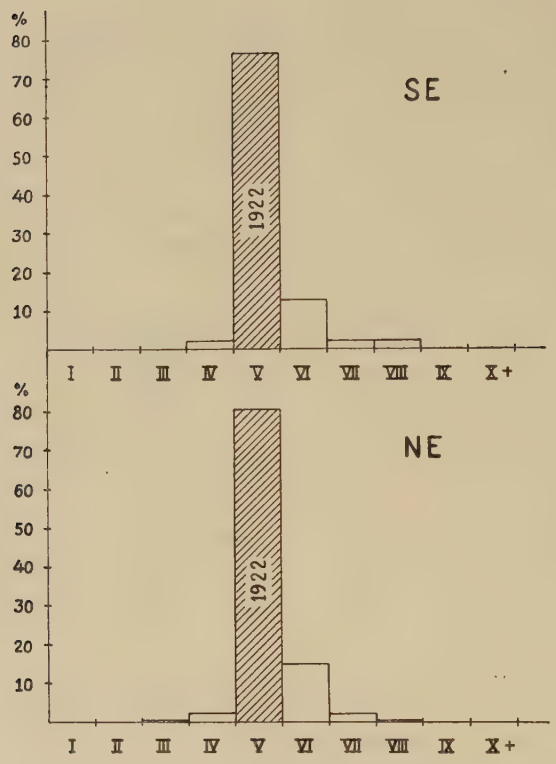


Fig. 10. Percentages of the different age-groups in two places off the South-east and the North-east Coast, 1927. SE = South-east Coast, Lónsvík. NE = North-east Coast, Hjeradsflói.

however, this group amounts to about 6 per cent. of the sample. Now the II-group in this year is precisely the 1922 year-class, the same which in 1927 made up about 80 per cent. of the catch from here. This group is thus already discernible in the trawl catches in 1924. The sample further shows a predominance of the 1920 year-class (the IV-group) which was dominant on the West Coast and to some extent also on the North in 1925 and 1926, but not on the South Coast. The stock of plaice on the East Coast of Iceland must be regarded as spawned, for by far the greater part, on other parts of the coast, the plaice grounds in these colder waters being supplied primarily by means of the currents.

The transport of the pelagic fry to the East Coast in 1920 may have been effected mainly from the north; the close resemblance between the eastern part of the South Coast and the East Coast proper in regard to the 1922 year-class on the other hand make it probable that the East Coast in 1922 may have received the majority of its abundant supply of the 0-group plaice directly over South-east Iceland.

It should here be pointed out that the interesting marking experiments in Vopnafjord on the East Coast in 1905 (cf. Johs. Schmidt, 1907, p. 8 f. and Bj. Sæmunds-

SON, 1913, p. 4 f.) clearly show that the plaice migrate from this northerly place along the East Coast to the South Coast; on the other hand we see the plaice migrating due west on the North Coast (cf. SCHMIDT 1907, p. 7); in some years a few plaice have migrated northwards along the East Coast (cf. SÆMUNDSSON 1913, p. 6). It is obvious that some stimulant or other has directed the migrating plaice on these different routes, and most probably this stimulant is an influx of warmer and salter water. This forces us, however, to suppose an influx of water along the bottom from the South Coast to the East Coast, at any rate in certain years or at a certain season. Unfortunately there is here as in many other places in Icelandic waters a lack of hydrographical observations throughout the year.

In 1927, July 8th, the "Dana" marked 250 plaice off Ingólfshøfdi on the South Coast; about 75 per cent. of the catches here belonged to the V-group in this year. The total of recaptures up to now amounts to 37.3 per cent.; practically all specimens were retaken near Ingólfshøfdi, and this shows that the migration of plaice of this age has no great extension on this part of the South Coast.

Rate of growth etc.

The present material from South and East Iceland enables us to form a general idea as to the conditions of growth on these coasts, and reveals features of considerable interest. Previous investigations of various species of fishes[1]) in Icelandic waters have shown that the growth is at its best on the South and West Coasts, slower on the North and East Coasts. There has, however, up to now been no opportunity for detailed investigation of the decrease in growth from west to east along the south and east coasts of Iceland, and it is precisely in this respect that the present material serves to illustrate the position. The plaice is, as a rather stationary fish in its immature stages, a fine object for these studies.

The list on p. 33—34 shows the stations in South and East Iceland. Some of these inside the territorial limit at depths from 15—65 metres yielded a sufficient quantity of material for the purpose of this investigation (Appendix Tables II—XIV).

The stations for 1925 and 1927 are as under (Table [26]), the limits of depth as noted from soundings taken while trawling being indicated in each case. In most places, the depth varies considerably within short distances, and it was not possible always to keep to a definite selected depth while trawling. This is of course a source of error in comparing the material from the different stations, but as will be seen later on, the main features are so pronounced that the resulting inaccuracy cannot affect the result to any essential degree.

As pointed out in the foregoing, the 1922 year-class is absolutely predominant, and the abundant material of this year-class thus affords a favourable opportunity of studying the growth in regard to place and time, i.e. in its variation along the South and East Coasts and in point of time from 1925 to 1927.

---

[1]) Cod: BJ. SÆMUNDSSON: Medd. Kom. f. Havunders. Fiskeri. VII. 3. 1923. Haddock etc.: BJ. SÆMUNDSSON: ibid. VIII. 1. 1925. H. THOMPSON: Procès-Verbaux. XXXIX, 1926 and LVII, 1929. Halibut: P. JESPERSEN: Medd. Kom. f. Havunders. Fiskeri. V. 5. 1917.

Figs. 11 and 12 give a graphical representation of the facts observed. Fig. 11 shows a sketch map of the south coast of Iceland whereon are marked those stations which are of importance in this connection; the numbers refer to the "Explorer" stations. Below this will be found a series of curves representing the mentioned 1922 year-class at different points along the coast; the ordinate and abscissa indicate length and number of the specimens examined. A dotted line connects the curves with their respective stations along the South Coast.

It will at once be seen that there is an enormous difference between the various localities on the South Coast in the length of individuals all belonging to the same year-class. The difference is indeed so great that the curves for the westernmost and that for the easternmost samples only overlap to a very slight extent.

The average lengths of the III-group in the five samples from 1925 are as shown in Table [27] p. 46.

The greatest difference between the average lengths of the samples thus lies, as noted, between the westernmost and the easternmost sample, and

[26].

1925	Station	Depth in metres	1927	Station	Depth in metres
Landeyjasandr	40	65	Landeyjasandr.....	3156	25—43
Eyjafjallasandr.....	43	45	Portland.....	3066	20—48
Ingólfshøfdi.....	47	24	Medallands Bay	3069	20—60
Mýra Bay.....	48	31	Ingólfshøfdi	3071	15—30
Lónsvík	49	39	Lónsvík.....	3075	36—43

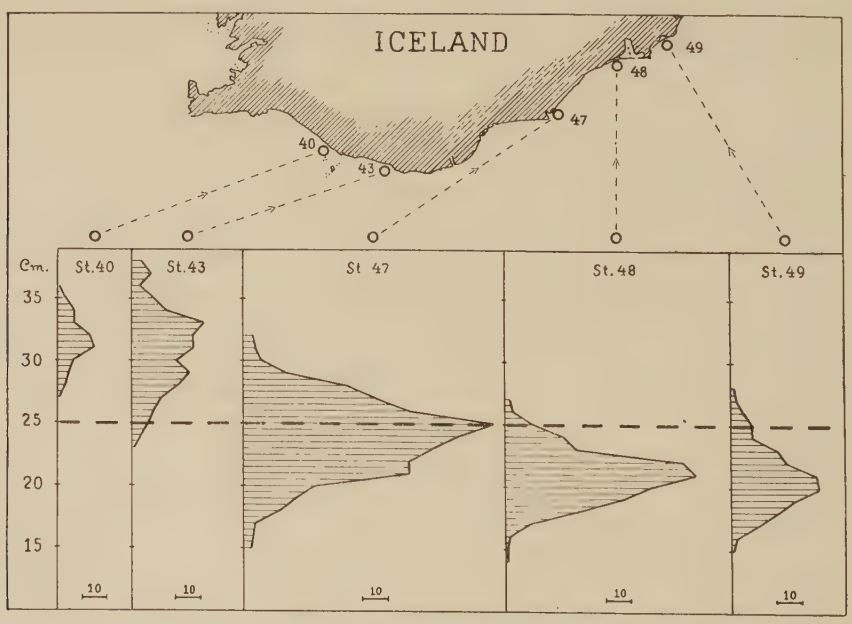


Fig. 11. Size of III-group Plaice in 1925 (the 1922 year-class) along the South Coast (see text). 10 = 10 specimens.

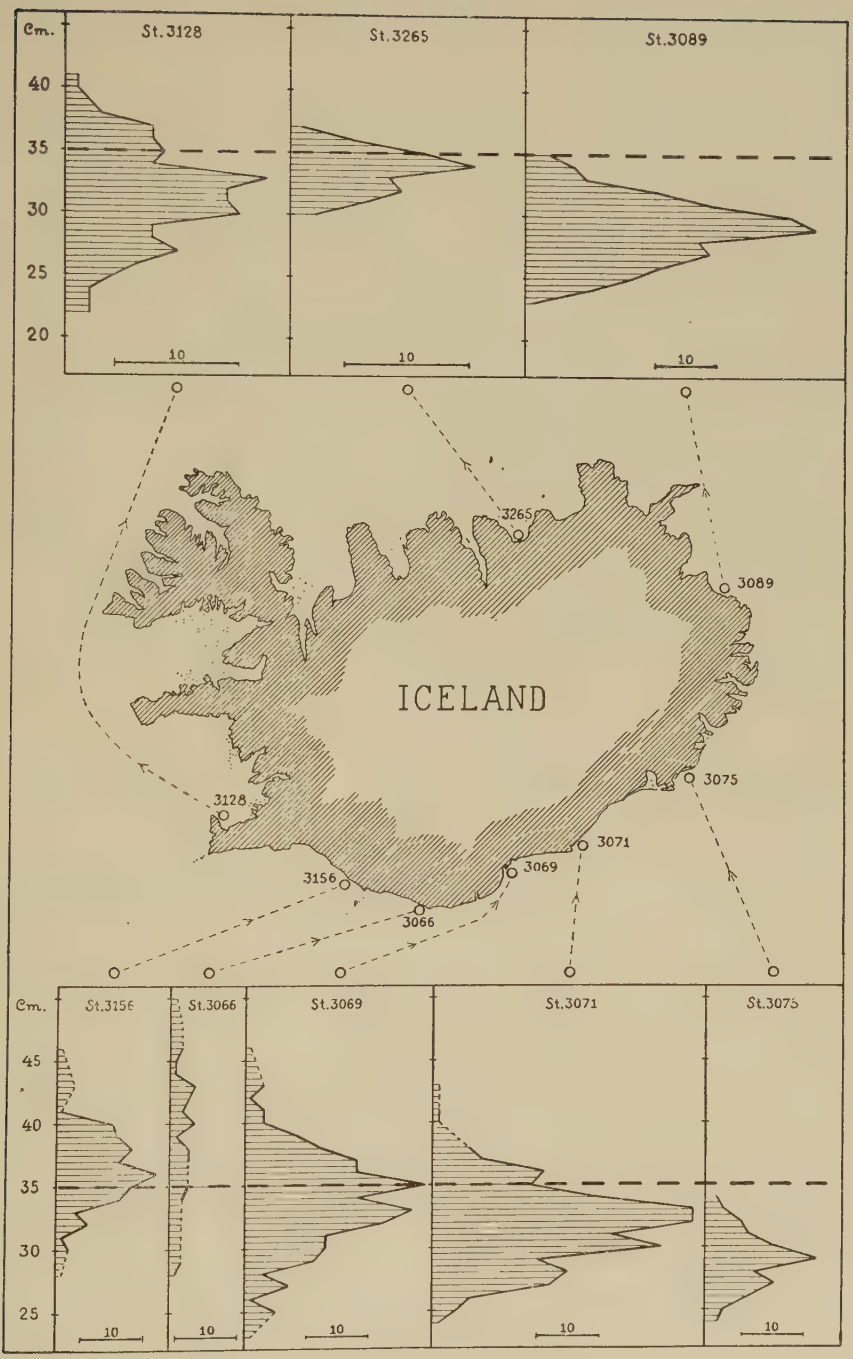


Fig. 12. Size of V-group Plaice in 1927 (the 1922 year-class) along the different coasts of Iceland (see text). 10 = 10 specimens.

[27].

Station No.	40	43	47	48	49
Average length in cm.[1])	*31.4*	*30.8*	*23.9*	*20.9*	*20.8*

[1]) not corrected by 0.5 here as elsewhere in the work.

amounts to no less than 10.6 cm. The difference in depths fished at the various stations, and the bathymetrical distribution of the plaice generally, of course preclude our taking the average lengths here given as absolute averages for the whole of the III-group at the respective longitudes on the south coast of Iceland from west to east. It is evident, however, even when allowing for the various sources of error, that the view thus obtained does in its main features truly represent a very considerable actual difference in the rate of growth along the south coast of Iceland. Consideration of the material from 1927 confirms this. Fig. 12 shows the sizes of the 1922 year-class at different parts of the coasts of Iceland; this year-class is thus the same as that we have just been considering, but it now appears, in 1927, as the V-group. During this year, 1927, material of this older age-group was also procured from suitable depths in other parts of the Icelandic waters, besides the South Coast, and above the sketch map will be found noted samples of the same group from Faxe Bay, Skjálfandi Bay and Hjeradsflói. It will at once be observed that the figure is in reality only a repetition of Fig. 11 but with this difference, that all the curves are shifted 5—9 cm. upwards.

The average lengths of the V-group in 1927 along the South and East Coasts are as follows:—

[28].

Station No.	3156	3066	3069	3071	3075	3089
Average length in cm.	*36.5*	*39.7*	*33.8*	*31.7*	*28.9*	*29.0*

In 1925, there was a considerable range of ground midway along the South Coast from which no material was procured; in 1927, a station was taken here, in the Medallands Bay (St. 3069) and it will be seen that the material from here falls excellently into line with the rest.

The greatest difference between average lengths of two samples is between the one from Portland (St. 3066) and that from Lónsvík (St. 3075), amounting to 10.8 cm., i.e. the same as in 1925.

The decrease in growth from west to east is fairly even, though not entirely so. It will be noticed that some of the plaice from the neighbourhood of Portland (see St. 43, Fig. 11, and St. 3066, Fig. 12) grow to a larger size than that observed farther to the west or farther to the east; this is most plainly evident in 1927, when the V-group at Portland (St. 3066) is about 3 cm. longer than the same group from the more westerly fishing ground at Landeyjasandr (St. 3156) and this despite the fact that the catches were from about the same depths and the samples from Landeyjasandr taken 3—4 weeks later than those from Portland, and had thus enjoyed a longer period of growth. It should further be noted that the sample from Landeyjasandr (St. 40) in 1925 was taken at a greater depth than that from the more easterly station (St. 43), and that we therefore at Landeyjasandr (St. 40) have a higher average size of plaice than samples

from trawling grounds nearer the coast would have demonstrated. We may therefore presume that the size of the plaice in these parts of the South Coast really was, in 1925, as in 1927, i.e. that the plaice from the neighbourhood of Portland enjoy the best conditions of growth to be found in these waters. Endeavours should, however, be made in future investigations to illustrate this further by procuring more detailed material from these grounds.

The figures, and the average lengths noted, further show that the difference in average length at the eastern extremity of the South Coast is very slight (cf. St. 48 and St. 49) and that no difference is discernible between the average lengths for the easternmost ground on the South Coast and the very northerly ground on the East Coast (cf. St. 3075 and St. 3089). In other words, the variation in the factor which on the south coast of Iceland gives rise to the marked decrease in rate of growth from west to east, is, on the South-east and East Coasts from about the middle of Mýra Bay or near Hornene and north of there (at any rate as far as Hjeradsflói) not great enough to produce any distinctly marked difference in the rate of growth.

As already pointed out, the greatest difference in average length between a western and an eastern sample on the South Coast is no less than about 10.5 cm. and this applies both to the III-group in 1925 and the V-group in 1927. In addition to what has been pointed out in the foregoing, it will be observed that the plaice of South-west Iceland show an extremely rapid growth; we find here, about July 1st, a III-group with no less than about 31 cm. length and at the same time of year a V-group approaching 40 cm. The greatest average length for these age-groups in all Icelandic waters is found here on the South-west Coast, where it reaches a figure apparently not exceeded in European waters. There is as shown a considerable decrease in the growth on the South-east and East Coasts, but we have not here the lowest averages known for these age-groups in all waters.

It would be most valuable to trace the individual growth of the plaice in different places on the South Coast. No marking experiments with plaice have hitherto been made here, and some commenced at Ingólfshøfdi will only begin to show results some years hence and should be extended also to some other localities.

In studying the rate of growth from 1925 to 1927 at different places it must be borne in mind that though the material was taken at the same time of year[1]), there was probably some difference in the depths at which the trawls were worked; that in 1925 a 60′ Otter Trawl, in 1927 a 50′ Otter Trawl was used; and that the plaice when approaching a length of 40 cm. or over in these waters become mature and migrate to the spawning grounds, whereafter a great number are not again met with so close in to shore. This and other migrations of the fish thus contribute to a general variation in the stock which is beyond our calculation.

It must also here be pointed out that it is of course impossible to ascertain, from the present material, the absolutely precise increment of growth from one year to another within the individual year-classes; we can, however, indicate such alterations in

[1]) At Landeyjasandr, however, (St. 40 and St. 3156) there is a difference of 3—4 weeks.

the average size of the fish as can occur from one year to another in the same locality, when a single age-group is particularly dominant. The following figures show average lengths for the samples dealt with (all year-classes) from the same or approximately the same grounds in 1925 and 1927.

[29].

All year-classes:	Landeyjasandr	Near Portland	Ingólfshøfdi	Lónsvík
1925	34.3 cm.	31.4 cm.	24.1 cm.	22.9 cm.
1927	34.5 cm.	38.5 cm.	30.9 cm.	30.8 cm.
Difference	0.2 cm.	7.1 cm.	6.8 cm.	7.9 cm.

On the western part of the South Coast, where greater admixture of older year-classes was noted (see Tables p. 38) there is but little difference in the size of the fish in 1925 and 1927; farther east, however, the difference between the average size for the total catches approximates to that between the average lengths of the dominant year-class for the two years, as will be seen from the Table [30] below compared with Table [29]. In places where the stock is generally composed of a whole series of different year-classes, we do not find such great fluctuations in the average length of the fish from year to year (cf. for instance Faxe Bay with the localities mentioned, Table [33] p. 54).

Taking the 1922 year-class alone in the four samples above noted, we find the following differences between the average lengths for 1925 and 1927:—

[30].

Year-class 1922:	Landeyjasandr	Near Portland	Ingólfshøfdi	Lónsvík
1925	31.4 cm.	30.8 cm.	23.9 cm.	20.8 cm.
1927	36.5 cm.	39.7 cm.	31.7 cm.	28.9 cm.
Difference	5.1 cm.	8.9 cm.	7.8 cm.	8.1 cm.

The three last-named samples show, at the localities mentioned, a growth of 8—9 cm. in the 1922 year-class during two years; the growth indicated for Landeyjasandr on the other hand is lower, probably owing to the difference in depth between the 1925 and 1927 samples in the first place (about 65 and about 25—43 metres respectively) and partly also to the migration of the largest individuals on attaining maturity. The difference in depth alone would suffice, as we know, to produce a marked difference between the average lengths of a year-class, as may be seen from the following example. A quite small sample from Ingólfshøfdi, taken in 1925, at 63 metres depth (cf. Appendix Table V and Table IV) distinctly shows that the larger plaice of a year-class keep to greater depths than the smaller ones; the sample consists only of 27 plaice, of which 19 belong to the III-group, and gives an average length for the III-group of 29.3 cm., which is about $5^1/_2$ cm. more than the average length of the III-group closer inshore, at about 24 metres depth, at the same place (23.9 cm.).

In East Iceland, where the period of growth must, from the hydrographical conditions, be regarded as short, the annual increment of growth is considered by

Sæmundsson 1913, p. 5, as probably about 2.3 cm. In 1927, the "Dana" took 648 plaice in Hjeradsflói on July 13th, and found the average length to be 29.2 cm.; a month later, on the 18th of August, 118 specimens were taken, showing an average length of 30.5 cm. This would give an increment of growth for the month in question, which is probably the best month for growth in these waters, of about 1.3 cm. There may, however, have been alterations due to migration from or to the ground, which we have no means of checking, and the value of the apparent increment of growth referred to is therefore perhaps problematic.

Hydrography and rate of growth.

On comparing the growth of the plaice on the South and East Coasts as above noted with the hydrographical conditions there prevailing, we find that the latter must be regarded as at any rate primarily responsible for the peculiar features of growth referred to.

Fig. 13 shows the temperature curves at 50 metres depth for the close of the winter and the spring months. As we know, the south coast of Iceland (as also the West Coast) is washed by relatively warm Atlantic water, whereas the East and North Coasts are blocked by cold water. Fig. 14 p. 51 shows thus the difference in temperature of the surface water for the South and East Coast throughout the twelve months of the year. Unfortunately we have no observations throughout the year from other depths, but the currents and strong tides on these coasts efface the differences in temperatures between the various water layers to some extent, so that the surface temperatures may well be used for our purpose.

A sharp boundary between the different water masses lies at the south-eastern corner of Iceland (near Hornene); it shifts somewhat from year to year, and in the course of the year itself. In North and North-west Iceland, the boundary between the cold and the warmer water is less pronounced, and is here effaced to a greater extent than at the south-eastern corner in the course of the summer, owing to the anticyclonic movement of the current on these coasts, which carries the warm Atlantic water from the west round the north-western corner of Iceland and thence eastward along the North Coast.

On comparing this brief summary of the hydrographical conditions in Icelandic waters with the bottom temperatures at the trawling stations noted on pp. 33—34 from the South and East Coasts in 1925 and 1927, June and July, it will be seen that even at this time of year there is still a distinct difference between the western and the eastern parts of the South Coast with regard to temperature at the depths here in question. It is natural therefore, as mentioned, to regard these peculiar hydrographical conditions as responsible for the fact that the decrease in the growth of the plaice already noted is so pronounced along the range from the south-western part of Iceland round to the East Coast. Fig. 15 p. 52 shows in illustration of this the curves for bottom-temperatures on the trawling grounds for April and July (1904 and 1927) and further the average size of plaice of a single age-group at different places along the South and East Coasts. We have here a striking instance of the very great importance of temperature as affecting the growth of the plaice, either directly, by the higher or lower

metabolism, in conjunction with the shorter or longer period of rest in the coldest part of the year, or indirectly, e.g. through the abundance or paucity of food material resulting from the conditions of temperature.

It is here of interest to remember the results of the transplantation of plaice from the Barents Sea to the North Sea (G. T. Atkinson 1910); the rate of growth shown

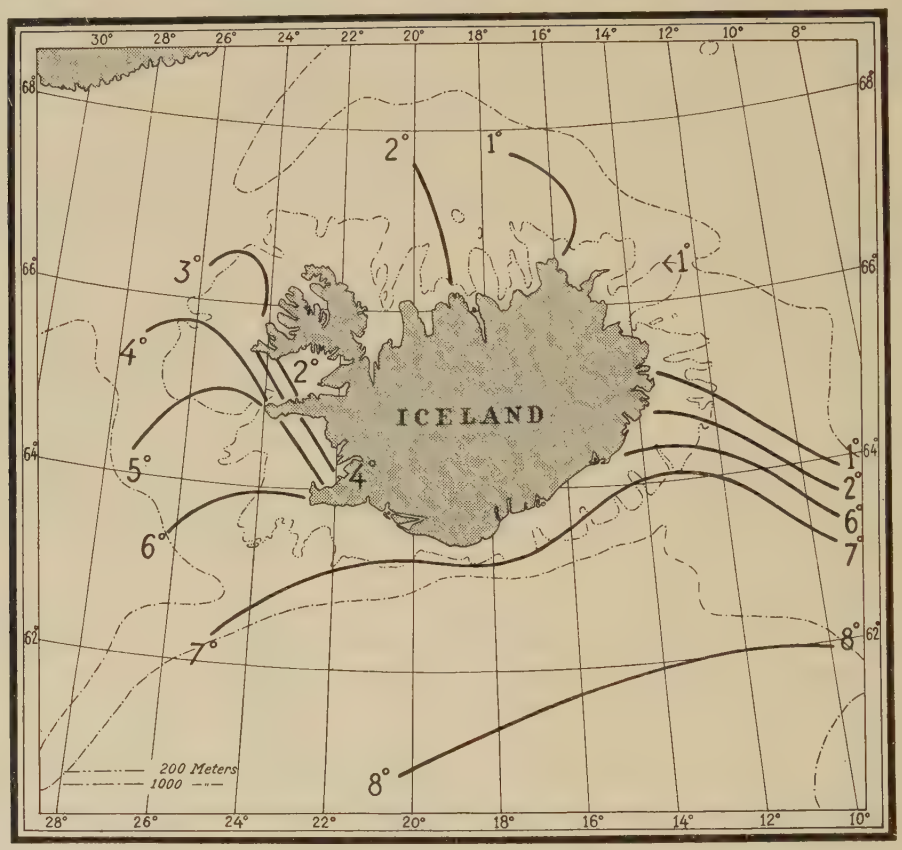


Fig. 13. The Isotherms at a depth of 50 metres during the end of winter and the beginning of spring. (Prepared by Dr. J. N. Nielsen, here from Schmidt 1926).

by the specimens recaptured in the North Sea was "much greater than that of the North Sea plaice of the same sizes and sex, which have been marked in the same way and set out again on the grounds where they have been caught. The growth has been many times faster than that indicated by the otoliths of plaice in the portion of the Arctic Ocean from which they were brought". Probably the cause of this rapid growth has been the change of temperature, but also the quantity and quality of food may partly be responsible for the observed unusual increase in length.

In the neighbourhood of Portland, where, owing to the bathymetric conditions, the warmer and salter Atlantic water comes closest in toward the shore on the

south, we find, as mentioned, a maximum in the growth of the plaice; this is, according to the investigations made up to the present, an absolute maximum for the Icelandic waters, and possibly absolute for the species as a whole. Minimum growth of the plaice is recorded from the east coast of Iceland, as far as the Icelandic waters are concerned; possibly there may be other parts of the whole area of distribution where it is even poorer than here.

It would be of much importance by means of aquarium experiments to study

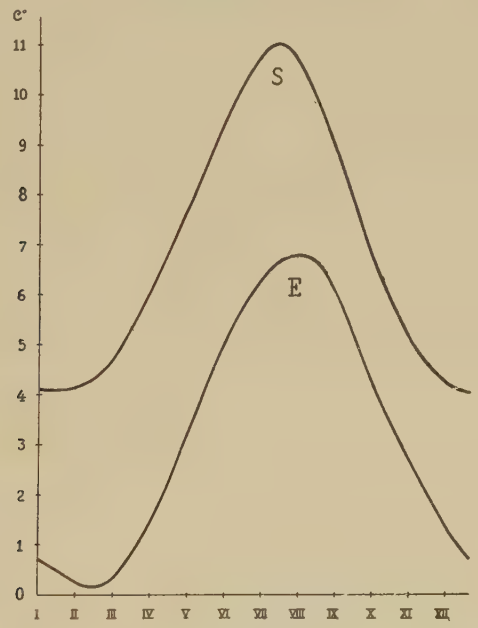


Fig. 14. Diagram illustrating the yearly variation in surface-temperature in coastal waters on the South Coast and the East Coast. (From Nautisk Meteorologisk Aarbog, figures here employed from Schmidt 1910). I, II, etc. = January, February etc. S = South Iceland, Westmanna Isle. E = East Iceland, Papey.

the degree of influence of temperature on the rate of growth in plaice. Fluctuations in temperature during the period of growth and from year to year may probably also in more southerly waters, as the North Sea, have greater influence on the rate of growth (and thus on the yield of the fishery) in these waters than generally supposed. The direct influence of temperature upon the metabolism has from purely physiological points of view been investigated in some freshwater and a few saltwater fish; the fishery biology has, however, up to this time payed too little attention to the influence of temperature on the rate of growth in plaice and other important food-fishes.

It is important to ascertain the maximal growth attainable by a stock under the most favourable conditions, but it is, however, also important to know the causes of the minimum of growth which a stock can exhibit short of partial extinction. It will be interesting therefore in the future to investigate more in detail the stock of plaice

living in the Icelandic waters off the South and East Coasts, with more precise attention to the following features, among others, than time has permitted up to now.

Quantity and quality of food materials, and fluctuations in these factors from year to year on the plaice grounds of the South and East Coasts should, to begin with, be subjected to close investigation. And in this respect it would be well to consider whether the enormous amount of fish refuse deposited by the great spring cod fishery on the western banks of the South Coast produces any specially abundant growth of the lower forms of life to the advantage of the plaice; such investigations

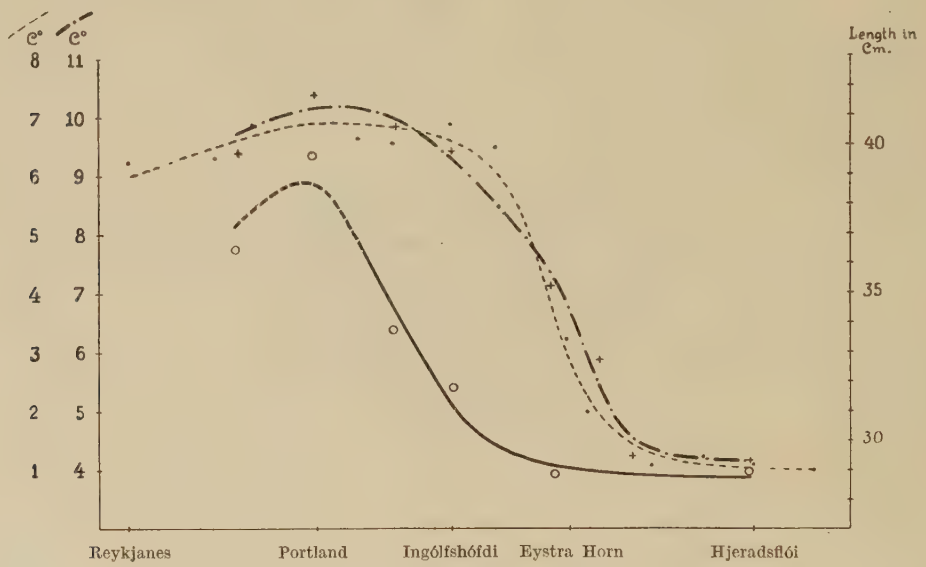


Fig. 15. Diagram showing the temperature and the average size of plaice along the South and East Coast.
--------- Bottom-temperature in April ("Thor" 1904).
—·—·— Bottom-temperature in July ("Dana" 1927).
——— Average length of V-goup plaice July 1927 (scale to the right).

should be based mainly on quantitative determination of the fish food of the sea floor. The migrations of immature and mature fish are insufficiently known as regards the South Coast; for the East Coast, an important contribution has been made in this respect[1]). The quantitative supply of the 0-group along the South and East Coasts, and how far this is affected by direction and intensity of the current, are questions which have not been studied; in some years, the cold water from the south-eastern corner of Iceland may possibly form an impenetrable barrier for the pelagic fry, which might then, especially on the eastern part on the South Coast, accumulate to a great extent, thus increasing the internal competition to the detriment of growth. The intensity of the fishery is very pronounced on all suitable trawling grounds along the South

[1]) Cf. Johs. Schmidt 1907 and Bj. Sæmundsson 1913.

Coast; possibly, however, there may be some difference in the degree of intensity between one part and another of this extensive range, such as might affect the conditions here in question; the statistics afford no information as to the particular locality from which the catches are derived; a point which ought to be included.

2. WEST ICELAND. FAXE BAY.

Material.

After the war, trawling was commenced in the southern part of Faxe Bay in 1924 inside and outside the territorial limit, at depths of about 30—45 metres, and was continued in 1925, 1926 and 1927, during the months of June—August. The samples, which were taken with the 50′ Otter Trawl, are noted below. In 1926 and 1927, small bobbins of about 25 cm. diameter were fastened to the ground rope; trawling experiments in which these bobbins were used are marked *. Soundings were taken several times during the trawling; the lowest and greatest depths recorded are given. Bottom temperatures from 6.12° to 9.83° were registered in a depth of abt. 30 metres on the trawling grounds in June—August 1924—27.

Appendix Tables XXVI—XXXIII give a survey of the material dealt with.

[31]. Extra-territorial:

Position: 64°08′ N. 22°23′ W. South of Sydra Hraun.

1924.

St. 2129.	June 11th—13th.....	Depth: 33 metres.	Trawling time: 12 hrs.	*154* plaice
St. 2139.	June 21st—25th.....	Depth: 34-37 metres.	Trawling time: 39 hrs.	*589* plaice

1925.

St. 2443.	July 30th—August 1st ...	Depth: 30-37 metres.	Trawling time: 15 hrs.	*79* plaice
St. 2446.	August 7th	Depth: 34-36 metres.	Trawling time: 4 hrs.	*2* plaice

1926.

St. 2648.	June 25th—27th.....	Depth: 34-40 metres.	Trawling time: 20 hrs.	*41* plaice
*St. 2659.	June 27th	Depth: 36 metres.	Trawling time: 6 hrs.	*22* plaice

1927.

*St. 3127.	July 18th—19th.....	Depth: 35-45 metres.	Trawling time: 25 hrs.	*355* plaice
	+ July 27th			

[32]. Intra-territorial:

Position: 64°04′ N. 22°35″ W. Off Keflavík (cf. Fig. 12 p. 45).

1924.

St. 2142.	June 25th—27th.....	Depth: 30-36 metres.	Trawling time: 17 hrs.	*2212* plaice
St. 2170.	July 6th—7th.....	Depth: 34-36 metres.	Trawling time: 15 hrs.	*1281* plaice

1925.

St. 2445.	August 1st—6th.....	Depth: 34-37 metres.	Trawling time: 20 hrs.	*3116* plaice

1926.

St. 2640.	June 21st—24th.....	Depth: 34-37 metres.	Trawling time: 28 hrs.	*990* plaice
*St. 2682.	July 1st	Depth: 35 metres.	Trawling time: 3 hrs.	*282* plaice

1927

*St. 3128.	July 20th—27th.....	Depth: 32-40 metres.	Trawling time: 30 hrs.	*3676* plaice
	+ August 1st—2nd			

Of the material from Faxe Bay above mentioned, all that from outside the territorial limit was age-determined, and suitable samples of that from the intraterritorial grounds likewise; in 1924 especially, a great quantity of material was devoted to this purpose, in order to provide a sound basis for future work here. From one or two per cent. to 10 per cent. of the specimens in the different samples had to be discarded as indeterminable.

At several other places in Faxe Bay, close inshore and in the adjacent fjords, material was collected during the summer in the years 1924—1927; samples were also taken at other seasons by the Icelandic and Danish inspection vessels. Some of this material has been worked up, but the only material here included is that which is of interest in connection with trawling at similar depths in other parts of the Icelandic waters.

In Appendix Tables XXVI—XXVII of the present work, the material dealt with from 1924 is noted, Tables XXVIII—XXIX give the material from 1925, and Tables XXX—XXXI that from 1926, Tables XXXII—XXXIII from 1927.

Remarks on the material.

As will be seen from the lists already given, the depth varies at the station inside as well as at the station outside the territorial limit between 30 and 45 metres; the object of this was to counteract the effect of bathymetrical difference in regard to density of the plaice. Johs. Schmidt has already, as noted on p. 3, given a brief survey of the results as regards quantity of plaice in June-August on the two mentioned trawling grounds in Faxe Bay; below will be found that portion of the table p. 148 in Procès-Verbaux, Vol. XLI 1927, which concerns the present investigations; the results for 1927 are also added.

[33].

Faxe Bay	Intraterritorial			Extraterritorial		
	Average size in cm.	No. per trawling-hour	Trawling-hours	Average size in cm.	No. per trawling hour	Trawling hours
1924, abt. July 1st ...	32.4	106.8	$32^3/_4$	33.8	14.6	51
1925, abt. August 1st.	29.3	155.8	20	33.5	4.3	19
1926, abt. July 1st ...	31.3	41.0	31	33.2	2.4	26
1927, abt. August 1st.	31.5	121.7	30	33.8	14.2	25

From the table, and the investigations, it appears that: At the seasons for which observations are available, the density of the plaice is highest on the intraterritorial ground, and lowest outside. The greatest number per trawling hour for the three years is about 150 inside as against about 15 outside the territorial limit, the corresponding lowest values being about 40 and about 3 respectively. There is considerable variation in the numbers from year to year; plaice were most numerous in 1925 on the intraterritorial ground (which agrees with the fact later noted that a single year-group was particularly numerous that year). The sizes of the plaice on the two trawling grounds lie chiefly between 25 and 40 cm., the average size for the whole stock being throughout about $1^1/_2$—4 cm. more outside than inside the territorial

limit; on the extraterritorial ground, the average size is almost the same for the four years, whereas the intraterritorial average can vary about 3 cm. in the same years (in agreement with variations in strength of the individual year-groups; *vide infra*).

The stock of plaice inside and outside Faxe Bay.

The extraterritorial trawling ground in Faxe Bay is worked more especially by English trawlers, which are constantly fishing there; and it will be interesting to com-

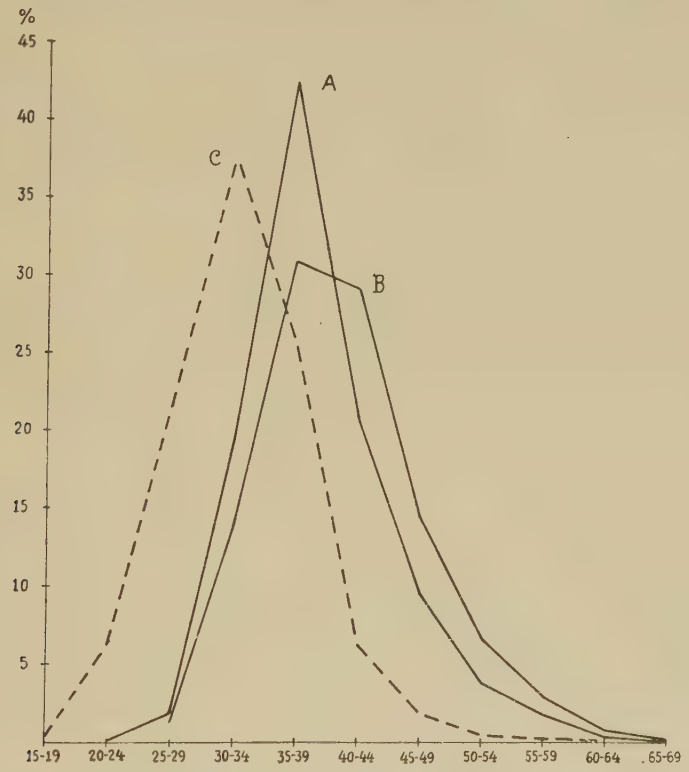


Fig. 16. Size composition of plaice taken inside and outside Faxe Bay. 5 cm. size groups. 1924. A = Off Snæfellsnes (English trawlers). B = Off Reykjanes (English trawlers). C = Faxe Bay ("Dana").

pare the plaice which these trawlers can take here with those taken by the trawlers at the mouth of the bay. Through Mr. J. O. Borley, of the Fisheries Laboratory at Lowestoft, we have received a number of measurements of plaice taken by commercial trawlers at the mouth of Faxe Bay, some north, off Snæfellsnes (Ondverdarnes)[1]) May 8th—9th, 1924, some south, off Reykjanes (Osar Bay and Cape Utskálar)[2]) May 6th—11th, 1924. The depth in both places was 45—50 fathoms, i.e. about 65—90 metres. The fish were for the most part either spawning or spent.

[1]) 14′ N.E. by N. ½ N. Ondverdarnes and about 23′ N.E. Ondverdarnes.
[2]) 4½′ N.W. Osar Bay, 6—10′ W. by N. Cape Utskálar.

The graph Fig. 16, p. 55 shows the curves for the catches from the two mentioned grounds side by side with the total catch made by the "Dana" the same year in the bay itself; the plaice found on the trawling grounds mentioned inside the bay are practically speaking all immature fish.

The average catch per trawling hour for the localities was as noted below. It must of course be borne in mind that the "Dana" material is not directly comparable with the trawlers' catches, as a smaller trawl was used in the former case (probably the catch of the small trawl is only $^1/_8$ or less of that of the commercial trawl).

[34].

	English Trawlers 1924 (Commercial trawl) (Depth 65—90 m.)		"Dana" 1924 (50′ Otter Trawl) (Depth 30—37 m.)	
	Snæfellsnes	Reykjanes	Extra-territorial St.	Intra-territorial St.
Total Number of plaice.....	1911	1118	739	3487
Number of trawling hours	$23^1/_4$	$24^1/_3$	51	$32^3/_4$
Number of plaice pr. hour....	abt. *82*	abt. *46*	abt. *15*	abt. *107*

The average lengths of the plaice at these localities are as follows:—

[35].

Average length	English Trawlers (Commercial Trawl) Snæfellsnes	Reykjanes	"Dana" (50′ Otter Trawl) Extraterritorial	Intraterritorial]
Females.....	$A_{388} = 44.7$ cm.	$A_{286} = 43.9$ cm.	$A_{371} = 34.2$ cm.	$A_{930} = 33.3$ cm.
Males	$A_{1312} = 37.2$ cm.	$A_{790} = 39.9$ cm.	$A_{372} = 33.5$ cm.	$A_{1227} = 32.0$ cm.
Total	$A_{1700} = 38.9$ cm.	$A_{1076} = 41.0$ cm.	$A_{743} = 33.8$ cm.	$A_{2212} = 32.6$ cm.

From the curves and figures here given it will be seen that, as usual, the larger plaice have moved out into the deeper water. It will also be noticed that the females out in deep water are relatively larger than the males in comparison with the catches of the two sexes in the bay itself. Inside the bay, the difference in average length between the two sexes is only about $^3/_4$ to $1^1/_2$ cm., whereas at the mouth, in deep water, it is about 4 and $7^1/_2$ cm.

The graph Fig. 17, p. 58 and the Tables [36—37] on p. 57 further show, with regard to percentage of the sexes, that the females here are greatly in the minority out on the trawling grounds at the mouth of the bay at this time of the year, i.e. at the close of the spawning period (cf. Hefford 1916). At Snæfellsnes we find only about 23 per cent. females and at Reykjanes only about 26 per cent. females. Inside the bay, the numbers of females and males are, in 1924, equal on the extraterritorial trawling ground, the females, however, being in a minority on the intraterritorial ground (about 45 per cent. of the catch here). The percentage of females is in all years (1924—1927) somewhat lower than that of the males on the intraterritorial ground, viz. about 42—45 per cent.; outside the territorial limit, the proportionate numbers are more nearly equal, being, for all years, about 48 per cent. females and 52 per cent. males. In South Iceland, we find, as mentioned on p. 37 the last-named figures for the two sexes. In the graph Fig. 16 and the Tables [36—39], p. 57, the percentage of males within the 5 cm. size-groups is indicated for the two Faxe Bay

grounds in 1924 and also for the English trawler catches in the same year at the mouth of the bay. As regards the bay itself, the graph and tables show that among plaice of

Sizes and Percentages of Sexes in Plaice from West Iceland 1924.

[36]. Snæfellsnes. 45—50 fathoms. May 8th—9th, 1924.
Commercial Trawlers.

5 cm-groups...	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	Totals
Females.....	0	6	23	65	94	114	54	29	5	1	*391*
Males	1	26	306	659	259	48	12	1	0	0	*1312*
Totals.....	1	32	329	724	353	162	66	30	5	1	*1703*
Percentage of											
females....	0.0	18.7	7.0	9.0	26.6	70.4	81.8	96.7	100.0	100.0	*23.0*
males	100.0	81.3	93.0	91.0	73.4	29.6	18.2	3.3	0.0	0.0	*77.0*

[37]. Reykjanes. 45—50 fathoms. May 6th—11th, 1924.
Commercial Trawlers.

5 cm-groups...	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	Totals
Females.....	0	5	31	55	66	55	32	26	8	2	*275*
Males	0	8	117	276	245	99	39	6	0	0	*790*
Totals.....	0	13	148	331	311	154	71	32	8	2	*1065*
Percentage of											
females....	0.0	28.5	21.0	16.6	21.2	35.7	45.1	81.2	100.0	100.0	*25.8*
males	0.0	61.5	79.0	83.4	78.8	64.3	54.9	18.8	0.0	0.0	*74.2*

[38]. Faxe Bay, extraterritorial station. 33—37 metres. June 11th—25th, 1924.
R/S "Dana".

5 cm-groups.....	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	Totals
Females.....	1	12	58	135	111	37	13	3	0	1	0	*371*
Males	1	12	58	151	113	25	9	2	1	0	0	*372*
Totals.....	2	24	116	286	224	62	22	5	1	1	0	*743*
Percentage of												
females.....	50.0	50.0	50.0	47.2	49.6	59.7	59.1	60.0	0.0	100.0	0.0	*49.9*
males	50.0	50.0	50.0	52.8	50.4	40.3	40.9	40.0	100.0	0.0	0.0	*50.1*

[39]. Faxe Bay, intraterritorial station. 30—36 metres. June 25th—27th, 1924.
R/S "Dana".

5 cm.-groups	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	Totals
Females	4	48	174	375	268	72	28	7	3	1	0	*980*
Males	3	83	286	496	300	51	7	1	0	0	0	*1227*
Totals.....	7	131	460	871	568	123	35	8	3	1	0	*2207*
Percentage of												
females.....	57.1	36.6	37.8	43.1	47.2	58.5	80.0	87.5	100.0	100.0	0.0	*44.4*
males	42.9	63.4	62.2	56.9	52.8	41.5	20.0	12.5	0.0	0.0	0.0	*55.6*

less than about 40 cm. — the approximate length at which maturity is attained in these waters — the males are rather more numerous than the females, but on passing the 40 cm. limit the males are seen to be more and more distinctly in the minority. The

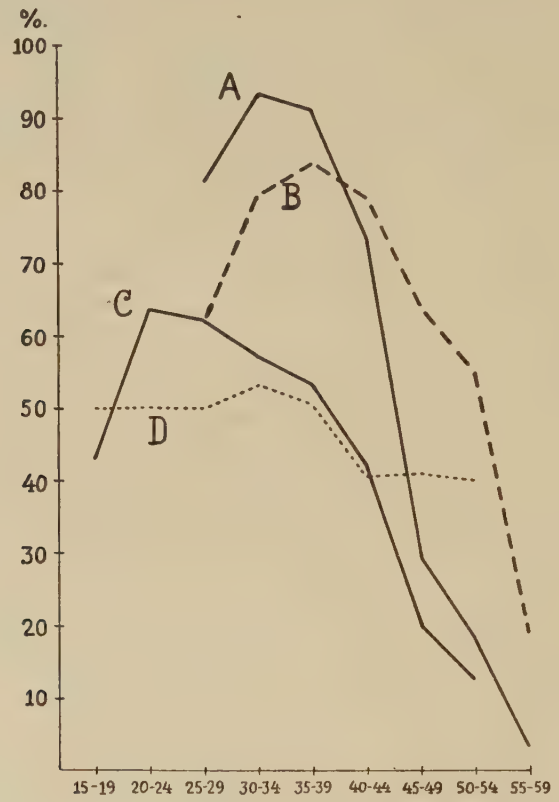


Fig. 17. Diagram illustrating the percentages of males in catches taken inside and outside Faxe Bay, May—June 1924. 5 cm. size-groups. A = Off Snæfellsnes. B = Off Reykjanes. C = Faxe Bay, intraterritorial. D = Faxe Bay, extraterritorial.

limit in question, however, — 40 cm. — is some centimetres above that for the greater part of the North Sea (cf. e.g. A. E. Hefford 1916, p. 5 f.). It will also be noticed that on the spawning grounds, where trawling is carried on (Tables [36—37]), the males are greatly predominant at this season among the plaice of less than 45 cm. (about 70—90 per cent.), whereas among those over 55 cm. there are but few males. The more southerly of these two trawling grounds, however, (Reykjanes) has a greater number of these large males than the one farther north.

Owing then to the larger size of the Icelandic plaice on attaining maturity as compared with those of the greater part of the North Sea, the limit for dominance of the males among the length groups is higher in these Icelandic waters than at more southerly latitudes; apart from this, the distribution in regard to sex does not appear to be at all unusual on the whole, but resembles the state of things elsewhere.

Marking experiments previously made in Faxe Bay.

These experiments afford valuable information regarding the migrations of the plaice in this area. The markings were made in 1908 and 1909, at the instigation of Johs. Schmidt, during the period from June 16th to July 9th, i.e. corresponding to the time of the trawlings mentioned in the present work. The material has been dealt with by Bj. Sæmundsson (1913) and while referring in general to the publication mentioned, we will here briefly sum up what is of interest in this connection. The plaice marked, numbering 732 in all, were chiefly from 27 to 35 cm. long (smallest 23, largest 53 cm.) and thus of similar size to those considered in the present investigations. Some of the fish were transplanted from one locality to another, but in all cases keeping within the southern part of Faxe Bay. The total number of recaptures is 232, or about 32 per cent. of the fish marked; barely 3 per cent., however, were retaken more than a year after liberation. Of the total recaptures, 78 per cent. were made within three months of the liberation, and all in Faxe Bay. Some of the recaptures show, however, that marked fish could still be taken in the bay even $2^1/_4$ years after the first markings, but none later. 95 per cent. of the recaptured plaice for which sufficient information as to position is available were taken in the bay itself; 5 per cent. had left the bay, and these were nearly all taken 9—11 months after liberation (none less than 9 months after). These last had either migrated southward to the neighbourhood of the Westmanna Isles, or northward to the waters off North-west Iceland. The average size of the fish moving south was on liberation 43.3 cm. (6 specimens of 34.5—53 cm.) that of those moving north only 33.6 (5 specimens of 30—38 cm.); it appears then, that the larger fish from the bay moved chiefly to the spawning grounds of the South Coast, while the smaller, presumably immature fish on the other hand nearly all moved north, the migration being, in their case, probably only in search of food. It may further be added that of the plaice which left the bay and were subsequently recaptured, about 45 per cent. were over 40 cm. on liberation or recapture, whereas among the plaice recaptured in the bay itself, only about 8 per cent. had attained that size. As will be seen from the tables at the end of the work, plaice up to about 40 cm. length are numerous at the mentioned localities in the bay, whereas specimens larger than this are few in number, these having left this part of the bay for the grounds at the mouth and elsewhere.

Age-composition and fluctuations.

The stock of plaice in Faxe Bay on the selected trawling grounds has been studied throughout the years 1924 to 1927, and we have already, as mentioned, given a small survey of the material from 1924 (Procès-Verbaux XXXIX, 1926, p. 154 f.). In the present work, we shall not enter upon any very detailed consideration of similarities and differences between the two grounds inside and outside the territorial limit in Faxe Bay, but will here *inter alia* study the conditions observed on these grounds in relation to those of South Iceland already mentioned in the foregoing. As regards the material from 1924, it was pointed out in the mentioned work, under age-composition, 1) that

the age-groups which characterised the two localities with the same depth conditions in Faxe Bay were the IV—VII groups; 2) that both out in the open bay and closer inshore all these four age-groups predominated, 3) that the percentage of individuals belonging to these different age-groups was practically the same at both places, 4) and finally, that the four dominant age-groups in 1924 were of more or less equal strength, the VII-group, however, (the 1917 year-class) somewhat ahead of the rest. On the other hand, as already mentioned, the fish were, at the time when this material was taken, far more numerous inside than outside the territorial limit.

For the year 1924, a great amount of material has been dealt with from both trawling grounds; but as it was found that a smaller number of otoliths (e.g. 250—300 specimens) gave sufficiently certain results as regard the age-composition of the stock, the work in the following years was restricted to samples of 270—470 specimens from the different grounds. This was also found necessary owing to the time occupied by these otolith determinations, as most of the otoliths from Faxe Bay had to be ground before they could be read with any degree of accuracy. Unfortunately, in 1925 and 1926, the number of plaice at the extraterritorial trawling station was so small that even about 20—25 hours' trawling could not give the desired 250—300 specimens. It will be seen from the following, however, that the present investigation is not seriously affected by the fact that the samples in question are rather small.

[40]. Intraterritorial ground, Faxe Bay.

Percentage of the different age-groups for the four successive years 1924—1927.

Age-group.....	III	IV	V	VI	VII	VIII	IX	X+	Total no. determ.[1])
1924	1.4	*19.8*	*21.8*	*21.4*	*30.2*	3.2	1.9	0.4	1969[2])
1925	9.8	*28.2*	*46.9*	8.2	4.5	2.5	0.0	0.0	245
1926	2.1	*14.2*	*25.9*	*43.9*	6.7	2.9	3.7	0.5	374
1927	7.9	*18.2*	*29.2*	*22.0*	*16.8*	4.5	0.5	0.9	470

[1]) Specimens indeterminable not included.
[2]) For this sample, see Rapp. et Procès-Verbaux XXXIX, 1926, p. 155.

[41]. Extraterritorial ground, Faxe Bay.

Percentage of the different age-groups for the four successive years 1924—1927.

Age-group.....	III	IV	V	VI	VII	VIII	IX	X+	Total no. determ.[1])
1924	4.1	*19.6*	*23.7*	*18.7*	*27.9*	3.1	1.9	1.0	700
1925	7.8	*16.9*	*41.6*	*18.2*	9.1	5.2	1.3	0.0	77
1926	1.6	*15.9*	*23.8*	*42.9*	9.5	4.8	1.6	0.0	63
1927	6.5	*17.4*	*33.2*	*24.7*	*14.1*	3.2	0.6	0.3	355

[1]) Specimens indeterminable not included.

What has been stated above with regard to the stock of plaice in 1924 was also found to hold good, in the main, for the years 1925, 1926 and 1927; there is, however, some variation in the situation from one year to another, owing to the pronounced fluctuation in the number of individuals belonging to the

different year-classes. The tables above [40—41], and the graph Fig. 18, p. 63 show the relative density of the age-groups during the four years covered by the investigations; details will be found in Appendix Tables XXVI—XXXIII.

Where any one age-group attains a percentage of over 10, the figures are italicised in the table; it will be noticed that such higher percentages all refer to groups IV—VII, which must thus be regarded as the dominant age-groups on these grounds. Of the remaining age-groups, only the III-group shows, in some years, viz. 1925 and 1927, any considerable strength, the older groups, VIII—IX, and those beyond, being poorly represented throughout, and never exceeding about 5 per cent. of the total stock. At an age of about 8 years, then, the plaice have practically disappeared from the grounds investigated in the bay itself; this migration however, begins among individuals of less than 7 years old, and somewhat earlier among the males than among the females; the material available up to date from grounds just outside the bay is not sufficient for a thorough consideration of this question, or the related question as to age at which maturity is reached, and the matter must therefore be left until later on.

The age-composition is more clearly shown in Fig. 18. On the left will be seen, one below another, the percentages for composition of the age-groups in 1924—1927 on the ground inside the territorial limit, and on the right, the corresponding ones for the extraterritorial ground.

It will be noticed first of all, as already pointed out in the case of 1924, that at the two places in Faxe Bay with the same depth, the age-composition is almost the same, both as regards the age-groups represented and their relative numbers; the greatest difference is observed in 1925, when the youngest year-classes are somewhat more strongly represented close inshore than out in the open waters of the bay.

It will further be noticed that certain year-classes are particularly prominent. In 1924, the four year-classes (group IV—VII) were all fairly equal in strength, the 1917, however, slightly ahead; this doubtless indicates that the year-class in question was extremely numerous, since, as the oldest of the dominant groups, it must have lost the greatest number owing to migration from the bay. In 1925, we find the 1920 year-class greatly predominant, its numbers being responsible for the fact that the intraterritorial trawlings this year showed the highest figure recorded for this ground (about 156 specimens pr. hour; see p. 54); in this year, the VI- and VII-groups are but poorly represented in the bay. The strong 1920 year-class (the V-group of 1925) might have been expected to appear in greater numbers in 1924, as the IV-group of that year, than was actually the case, but when fishing closer inshore in the bay, it soon becomes apparent that only part of the IV-group has moved out to 30—40 metres depth, the remainder still keeping close to land; even fish of the V-group and over may be found in not inconsiderable numbers close inshore. In 1926, the 1920 year-class, now as the VI-group, is still greatly predominant; it is interesting to note that it furnishes practically the same percentage of the stock in 1925 and 1926 (e.g., on the intraterritorial ground, abt. 47 and abt. 44 per cent.). It is, however, only

the relative composition of the year-classes that is the same in 1925 and 1926, the actual catch being, as shown in the accompanying table [42], much smaller in 1926 than in 1925 (of the 1920 year-class for instance, in 1925 abt. 73 specimens per hour, as against only abt. 18 per hour in 1926). But again it must be borne in mind that the 1925 material was taken about August 1st, that for 1926 on the other hand about July 1st, i.e. at a time when the number of plaice, according to our few years' experience of this intraterritorial locality, was somewhat lower than it has been found a month later (cf. Table [33] p. 54).

[42]. Numbers per trawl hour for the different year-classes in 1924—27.

Faxe Bay. Intraterritorial ground.

	Total no. pr. trawl hour	Year-class 1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
1924	107	2	3	*32*	23	24	21	2	..	..	..
1925	156	..	..	4	7	13	*73*	44	15	..	..
1926	41	..	..	1	1	3	*18*	11	6	<1	..
1927	122	..	..	..	<1	6	21	27	*35*	22	9

In 1927, the four age-groups are more uniform in strength, and the general appearance is more like that in 1924 than in any other year. The 1920 year-class, now in its seventh year, has to a great extent moved out from the bay; possibly the migration in 1927 may have taken place earlier, as regards the 1920 year-class, than was the case in 1924 with the 1917 year-class which was then the VII-group. In 1927, however, the 1922 year-class is dominant, as it was so absolutely in South Iceland the same year. That it was less in evidence, in 1926 and 1925, on these grounds than in South Iceland is due to the fact that while constituting the III-group, and partly also as the IV-group, it does not rightly "belong" to the locality; possibly the supply of young fry in 1922 was not so extraordinary extensive in West Iceland waters as it must have been in some parts of the South and East.

The 1922 year-class, so strong in 1927, was in 1925, as the III-group, somewhat more numerous than the III-groups appeared in 1924 and 1926; and since the III-group in 1927 is of corresponding relative size among the stock to that of the III-group in 1925, and since it is fairly strong on the South and North Coasts[1]), it is reasonable to expect that this year-class (1924) will prove one of the strongest about 1929. This supposition is further confirmed by investigation of material from a trawling ground of similar depth to those here dealt with (33—35 metres) but situated farther up in Faxe Bay in the intraterritorial waters north-west of Engey (about 64°11′.7 N., 21°57′.3 W.). The average per trawl hour here, in 1926 (June 30th) was about 75 specimens, the average length 28.2 cm., while in 1927 (August 4th) it was about 300 per hour with average length only 26.1 cm.; and about $^1/_4$ of these plaice belong to the 1924 year-class, (i.e. the III-group; groups IV—VI, however, were also well represented).

The material from the trawling grounds in Faxe Bay 1924—1927 at depths from

[1]) See p. 39 and p. 77.

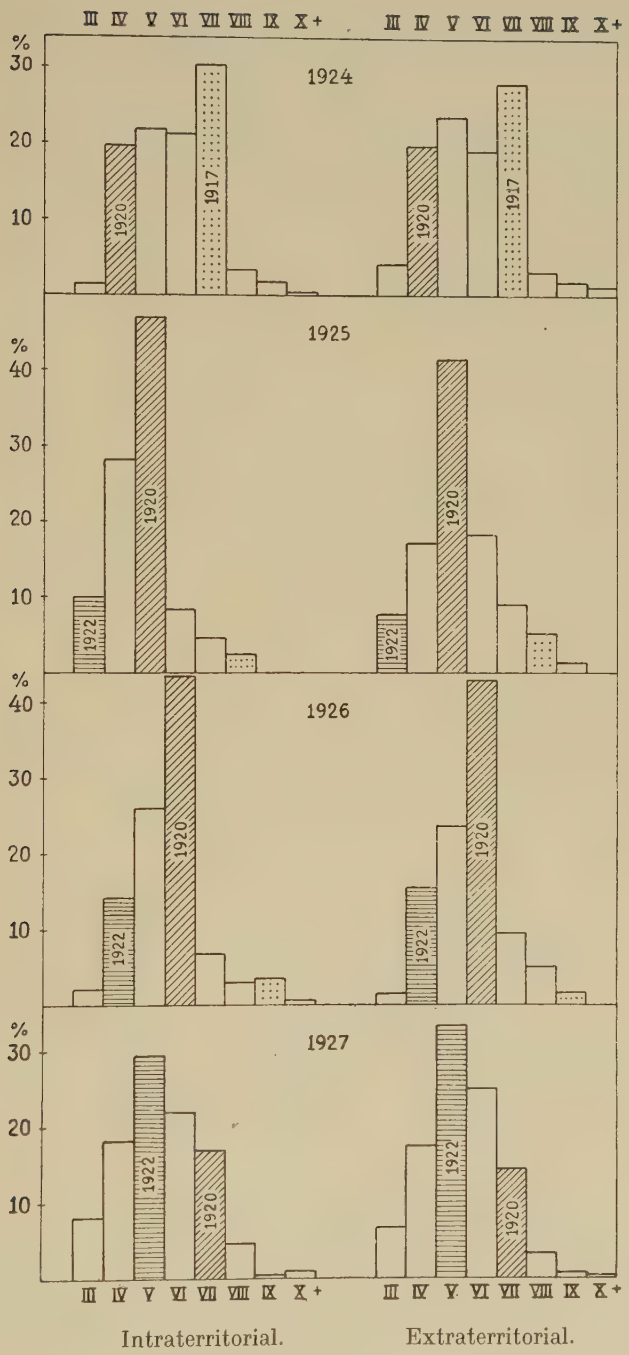


Fig. 18. Percentages of the different age-groups in the intraterritorial and extraterritorial stations in Faxe Bay for four successive years. Depths in both places about 30—45 metres. Dominant year-classes shaded.

about 30—40 metres thus shows that the following of the 1915 to 1924 year-classes were more strongly represented than the rest:

1917, 1920, 1921, 1922.

Compared with South Iceland, the 1922 year-class was strongly represented in both places, more so in South Iceland. The 1917 and 1920 year-classes do not appear in the

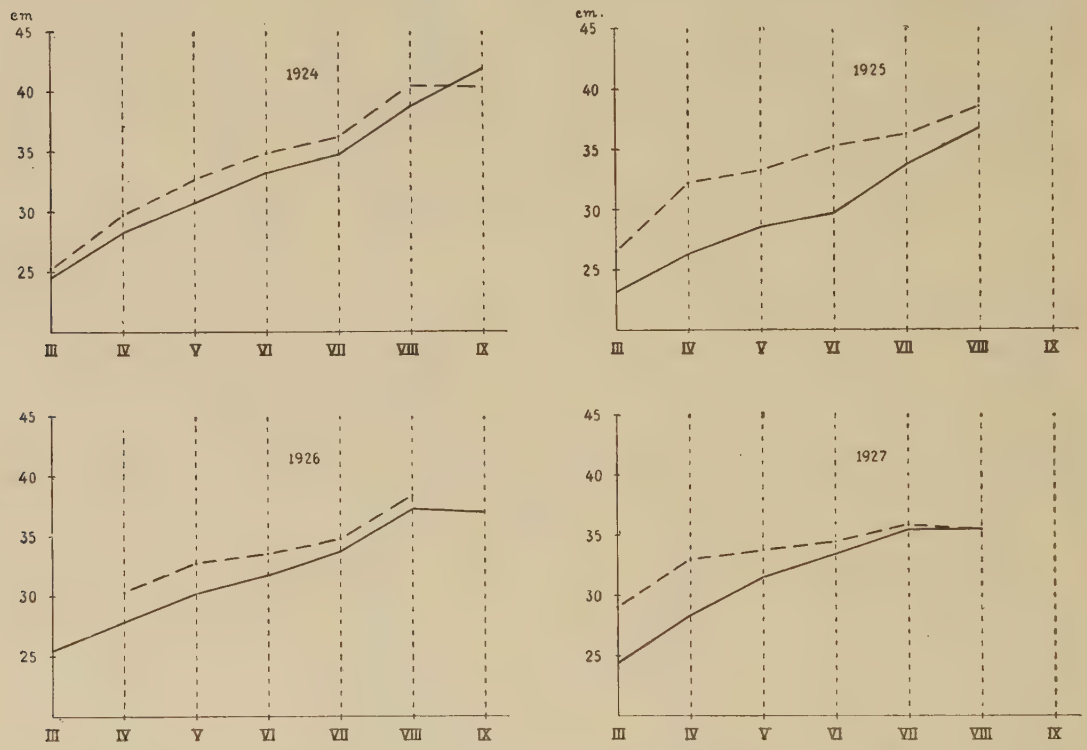


Fig. 19. Diagram showing the average length of the different age-groups in Faxe Bay 1924—27.
– – – – Extraterritorial station. ——— Intraterritorial station.

material from South Iceland in 1925 and 1927 to any noteworthy extent. The 1921 year-class must further be noted as fairly well represented, the 1923 year-class being apparently poorer.

Rate of growth etc.

Bj. Sæmundsson (1913, p. 20) judging from individual investigations based on marking experiments, estimates the annual increment in this part of Iceland at about 6 cm. This annual increment of 6 cm. is of course not found by following up a single year-class on the mentioned trawling grounds from one year to another, as there is a constant but non-calculable emigration of the larger individuals and immigration of smaller ones; among the year-groups predominating on these grounds in Faxe Bay, consisting, for by far the greater part, of large immature fish, the length increment of

any year-class from year to year is therefore less. But with the present material from Faxe Bay we can, for these waters, trace the alteration in size on a restricted trawling ground from year to year.

In the previous work on material from 1924 (TÅNING 1926, p. 158—159) we were able to show 1) that the average length of the fish in extraterritorial waters was greater (1.5 cm.) than inside the limit, 2) that this applied to all year-groups, and 3) to both sexes. In the three following years, the result from 1924 is found to be confirmed.

Fig. 19 shows, for all four years, the average lengths within the age-groups for intra- and extraterritorial waters; the graph is further supplemented by Tables [43—44].

Average length of the age-groups IV-VII in Faxe Bay.

[43]. Intraterritorial:

Year-class	Trawl catch from 1924 abt. July 1st	1925 abt. Aug. 1st	1926 abt. July 1st	1927 abt. Aug. 1st	Age-group
1917	34.7				
1918	33.2	33.8			
1919	30.8	29.7	33.6		
1920	28.1	28.4	31.7	35.4	
1921		26.3	30.1	33.3	*VII*
1922			27.9	31.4	*VI*
1923				28.3	*V*
					IV
Average length of sample investigated	*32.6*	*27.8*	*31.4*	*31.7*	
Aver. length of total catch	32.4	29.3	31.3	31.5	

[44]. Extraterritorial:

Year-class	Trawl catch from 1924 abt. July 1st	1925 abt. Aug. 1st	1926 abt. July 1st	1927 abt. Aug. 1st	Age-group
1917	36.1				
1918	35.0	36.1			
1919	32.7	35.2	34.8		
1920	29.5	33.1	33.4	35.7	
1921		32.2	32.7	34.4	*VII*
1922			30.3	33.7	*VI*
1923				33.0	*V*
					IV
Average length of sample investigated (= total catch)	*33.8*	*33.5*	*33.2*	*33.8*	

The tables show the average length of the four dominant age-groups so arranged that, reading horizontally, we can follow the year-classes, and reading obliquely downwards, the age-groups, from one year to another. The catches in 1925 and 1927 were

made about 1 month later than in 1924 and 1926; it will be seen that the average length in 1927 is on the whole somewhat greater than in 1924 and 1926, when the growth period for the catches was a month shorter; this point does not come out clearly in the figures for the material from 1925, which was also taken a month later than that from 1924 and 1926 (*vide infra*).

The entire catch of fish from the extraterritorial ground shows an average size from 1.4—2.3 cm., in 1925 as much as 4.2 cm., beyond that for the intraterritorial ground. Taking the average length of the two sexes separately we find that the females as well as the males are about 1—2 cm. larger outside than inside the territorial limit, in 1925 even more (see Appendix Tables XXVI, XXVIII, XXX, XXXII compared with Nos. XXVII, XXIX, XXXI, XXXIII).

As regards the separate age-groups, the same holds good, at any rate for those of which sufficient material is available: the average length is greatest outside the territorial limit for all the dominant age-groups, and this holds good also for the two sexes within each age-group (see the Appendix Tables referred to above).

It will be seen from the tables that there is, however, no particularly marked difference in the average lengths of the four dominant age-groups, nor in the average lengths of the year-classes from one year to another, which thus shows that the growth in this part of West Iceland is slow. It will further be observed that the average length of the separate age-groups is more or less the same for the four years, but, as just pointed out, greater outside than inside the territorial limit. It must here of course be borne in mind, as already noted, that there can be a difference of a month between the samples. The three youngest age-groups in 1925 moreover, show, as also previously observed, a somewhat lower average length inside the limit than in other years. This was already apparent in the average length for the whole catch in that year, and must doubtless be attributed primarily to immigration of more small fish than usual, this again being very likely due to the encroachment of the strong V-group demanding more room closer inshore; also, the average length for the trawl catch used for age analysis is somewhat (about 1.5 cm.) below the average for the total catch.

As will be seen later on in chapter VI p. 91, we find that the plaice in the extraterritorial water in Faxe Bay enjoy better conditions of life than inside the limit. It will, however, be seen from Fig. 19 (and Table [44]), that there is on the whole less difference in length between the age-groups in the extraterritorial water than between the same groups inside, especially so in 1926 and 1927 between group V and VI and between VI and VII. The cause of this lies doubtless mainly in an emigration out of the open waters of the bay, especially on the part of the larger fish. We do not think, as the great majority of the fish are over 25 cm., that the trawlers out in the open bay capture especially the larger specimens of the oldest year-classes and thus artificially bring about a drop in the average size among the older fish in the extraterritorial waters.

These considerations, however, do not affect the main point, viz. that in Faxe Bay, we encounter the same position with regard to size of the plaice as for instance in the North Sea, to wit, that the average size of the age-groups increases with increasing distance from shore (the depth being alike on the two grounds investigated in the Bay), but that the growth in Faxe Bay is slow as regards the age-groups of plaice investigated.

Faxe Bay is the only part of West Iceland from which we have suitable material, and we cannot therefore, for this coast as a whole, give a survey of the growth from a series of localities, as in the case of South Iceland. The material employed by K. Jessen (1909, see p. 253) affords no information as to this; all the samples are procured from fjords in which the growth of plaice varies from one to another, probably according to local conditions. Comparison of the available samples in the present work from West and North Iceland with those from South and East Iceland will, however, help us to understand the growth of the plaice in different parts of the Icelandic waters.

The work on the South Coast of Iceland in 1925 and 1927 has provided us with a kind of standard for growth under different conditions in these waters. Unfortunately, however, the composition of the stock of plaice as regards the different age-groups is far from being the same in Faxe Bay as on the South Coast; this will readily be seen on comparing Fig. 9 p. 40 with Fig. 18 p. 63, as also, that direct comparison between the average length for the total catch on these two coasts is out of the question here, as an indication of the conditions of growth. It will be observed, for instance, that in South Iceland, in 1925, the III-group made up the greater part ($^4/_5$), and in 1927, $^1/_5$ of the entire material, whereas at the corresponding depths in Faxe Bay, this group is but very poorly represented. On the South Coast, in 1925, we find this group, to the east, made up of specimens considerably smaller than on the trawling grounds at corresponding depths in Faxe Bay, and it is thus doubtless only the great numbers of older fish monopolising space and food, which in Faxe Bay keep the smaller III-group plaice away from the grounds in question.

Despite all differences, however, the present material affords opportunities of comparing the size of some age-groups in Faxe Bay with the corresponding ones in South Iceland for 1925 and 1927, and we can from this endeavour to determine whether the plaice in Faxe Bay belong to the rapid or slow growth section of the stock in Icelandic waters.

On glancing at the figures (see Appendix Tables II—XIV and XXVI—XXXIII) for average length of the age-groups in the four years covered by the material, we find, for the groups in which we are here interested, the extreme values of average lengths for the intra- and extraterritorial waters of Faxe Bay and the intraterritorial waters of South Iceland as given p. 68, Table [45].

In Faxe Bay, the III-group at the stations in question consists mainly of the largest specimens, whereas this is not the case in the material from the South Coast, where larger specimens of the group were evidently to be found still farther out in deeper water (e.g. at Ingólfshøfdi, 1925, Appendix Table IV—V). This means, of course, that the present material of the III-group alone is not sufficient to determine what part

of South Iceland is most nearly comparable to Faxe Bay in regard to growth of the plaice. The average lengths for the IV- and V-groups, however, distinctly suggest that growth in Faxe Bay corresponds to that at Ingólfshøfdi, or rather a little east of there.

[45]. Average length of III- to V-group plaice in centimetres.

Age-group	Faxe Bay, intraterritorial. Depth: 30—40 m.	Faxe Bay, extraterritorial. Depth: 30—45 m.
V	28.4—31.4	32.7—33.7
IV	26.3—28.3	29.5—33.0
III	23.1—25.4	26.2—29.1

	South Iceland.			
Age-group	Landeyjasandr (St. 40 & 3156)	Near Portland (St. 43 & 3066)	Ingólfshøfdi (St. 47 & 3069)	Lónsvík (St. 49 & 3075)
V	36.5	39.7	31.7	30.9
IV	32.6—36.4	34.0—37.1	29.1—29.3	25.1—28.9
III	28.9—31.7	29.3—30.8	23.9—25.4	20.8

On comparing the figures in the table above it will thus be seen that the plaice of the intraterritorial waters in Faxe Bay are nearest in size to those taken in the neighbourhood of Ingólfshøfdi, and the plaice of Faxe Bay thus belong to the slow-growing portion of the stock in Icelandic waters, albeit not among the slowest.

The question as to whether any cause or causes can be found to account for the fact that the stock in Faxe Bay resembles mostly in this respect that of the eastern parts of South Iceland, and not that of the nearer, western part of this coast, cannot as yet be determined with certainty, as we have not sufficient detailed knowledge regarding density of the stock, quantity of food etc. along all the coasts of Iceland. It has already been pointed out that the density on the South Coast, according to the investigations of 1925 and 1927, is greatest in the neighbourhood of Ingólfshøfdi inside the limit, but it can also be quite considerable towards the west, despite the stock of larger plaice here, and less than at Ingólfshøfdi farther towards the east, despite the smaller plaice here. The density in Faxe Bay seems, however, from the investigations of 1927 (cf. pp. 36 and 54) to be nearly the same as at Ingólfshøfdi in that year. With regard to the amount of food along the Icelandic coasts, too little is known as yet, these investigations having only recently been commenced (cf. Spärck 1929, p. 10).

In Faxe Bay (off Akranes), the temperature is lower, for more than 4—6 months of the year, than on the western part of the South Coast (Westmanna Isles) though the distance is only short (see Fig. 20). East of Ingólfshøfdi, as far as Eystra Horn, the temperature has not been studied so closely during the year as at the localities mentioned. From our knowledge of the hydrography of these parts, however, there is a constant struggle here between the cold water from the East Coast and the warm Atlantic water, and in any case, the more pronounced fall in the temperature in Faxe Bay during

winter must be more like what we find on the eastern than on the western parts of the South Coast. We have already mentioned, p. 49 f., that the growth of the plaice on the South and East Coasts strikingly reflects the distribution of temperature in these waters, and in Faxe Bay also, the temperature is doubtless of great importance to the growth of the plaice, though it should not be regarded as the only decisive factor, seeing that density of the stock, and abundance or paucity of food material, may greatly affect the growth, as has been clearly shown by investigations in the North Sea and the inner Danish waters.

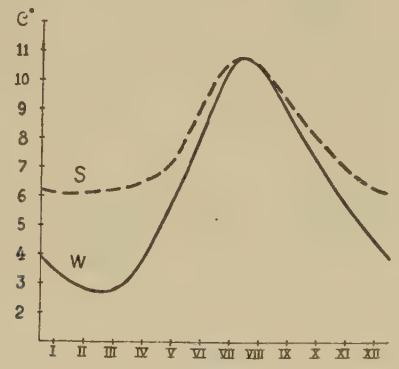


Fig. 20. Diagram illustrating the yearly variation in surface-temperature off the Westmanna Isles on the South Coast and in Faxe Bay on the West Coast. I, II, etc. = January, February etc. – – – – South Coast[1]). ——— West Coast[2]).

3. NORTH ICELAND. SKJÁLFANDI BAY

Material.

The trawling, which was commenced in 1924, was continued in 1925, 1926 and 1927 during the months of July and August on the intraterritorial trawling ground in the innermost part of the Bay; the hauls were made, some in quite shallow water less than 15 metres depth, and some in deeper water. In addition, at Húsavík, up in the eastern side of the bay, the eel hand seine was used for capture of the youngest year-groups. As to bottom temperatures see Table [49] p. 72.

[46].

1924.

St. 2205.	66°01′ N.	17°30′ W.	July 25th.....	Depth: 20-50 m.	Trawling time: 7 hrs. *394* plaice
St. 2207.	66°01′ N.	17°30′ W.	July 26th.....	Depth: 36-54 m.	Trawling time: 1 hr. *51* plaice
St. 2209.	66°01′ N.	17°30′ W.	July 26th-27th	Depth: 20-50 m.	Trawling time: 9 hrs. *506* plaice
St. 2208.	66°00′ N.	17°30′ W.	July 26th.....	Depth: 15-20 m.	Trawling time: 2 hrs. *61* plaice
St. 2210.	65°59′5 N.	17°30′ W.	July 27th.....	Depth: 7-10 m.	Trawling time: $^1/_3$ hr. *417* plaice
St. 2206.	Húsavik.		July 26th.....	Depth: 6-9 m.	Eel hand seine. *271* plaice

[1]) Westmanna Isles. Surface temperatures. Ships' observations from 1897—1906 (Nautisk Meteorologisk Aarbog).

[2]) Faxe Bay. Surface temperatures taken off Akranes (Jacobsen and Jensen, Procès-Verbaux XXXIX, 1926, p. 79).

1925.

St. 2458.	66°01′ N. 17°30′ W.	Aug. 10th-11th	Depth: 19-34 m.	Trawling time: 6 hrs.	*171*	plaice
St. 2459.	66°00′ N. 17°30′ W.	Aug. 11th....	Depth: 7-10 m.	Trawling time: $^1/_2$ hr.	*246*	plaice
St. 2460.	66°01′5 N. 17°30′ W.	Aug. 11th....	Depth: 55-80 m.	Trawling time: $^1/_2$ hr.	*8*	plaice

(Húsavík: eel hand seine not used.)

1926.

St. 2790.	66°01′ N. 17°30′ W.	July 16th	Depth: 20-38 m.	Trawling time: 5 hrs.	*41*	plaice
St. 2910.	66°01′ N. 17°30′ W.	July 27th	Depth: 34 m.	Trawling time: 1 hr.	*19*	plaice
St. 2791.	66°01′5 N. 17°30′ W.	July 16th.....	Depth: 50-90 m.	Trawling time: 1 hr.	*5*	plaice
St. 2792.	66°03′ N. 17°30′ W.	July 16th.....	Depth: 110-113 m.	Trawling time: $^1/_2$ hr.	*No*	plaice
St. 2793.	66°00′ N. 17°30′ W.	July 16th.....	Depth: 8-15 m.	Trawling time: $^1/_2$ hr.	*20*	plaice
St. 2933.	66°00′ N. 17°30′ W.	July 31st.....	Depth: 7-8 m.	Trawling time: $^1/_2$ hr.	*63*	plaice
St. 2795.	Húsavík.	July 16th-17th	Depth: 5-0 m.	Eel hand seine.	*265*	plaice

1927.

St. 3100.	66°00′5 N. 17°30′ W.	July 14th.....	Depth: 20-30 m.	Trawling time: 1 hr.	*15*	plaice
St. 3265.	66°00′5 N. 17°30′ W.	Aug. 16th....	Depth: 15-35 m.	Trawling time: 6 hrs.	*172*	plaice
St. 3101.	66°00′ N. 17°30′ W.	July 14th.....	Depth: 9-20 m.	Trawling time: $^1/_2$ hr.	*6*	plaice
St. 3266.	66°00′ N. 17°30′ W.	Aug. 16th....	Depth: 9-20 m.	Trawling time: $2 \times ^1/_2$ hr.	*6*	plaice
St. 3102.	66°01′5 N. 17°30′ W.	July 14th	Depth: 40-60 m.	Trawling time: 1 hr.	*19*	plaice
St. 3267.	Húsavík.	Aug. 16th....	Depth: 5-0 m.	Eel hand seine	*223*	plaice

Appendix Tables XV—XXV show the material used for age-determinations for the purpose of the present work. It was taken, as will be seen, between July 14th and August 16th.

Remarks on the material etc.

In Skjálfandi Bay, the plaice keep to a rather narrow belt, about three nautical miles from the coast outward; this ground falls away abruptly to greater depths than plaice generally frequent (over 150—200 metres).

It is interesting to compare the stock of plaice here, in Skjálfandi Bay, with that of Faxe Bay from the fishery point of view alone. The Skjálfandi trawling ground, from about 7 metres' depth out to about 50 metres', in some years shelters a stock of much larger plaice than are found on the corresponding grounds e. g. in Faxe Bay. In 1924, for instance, Johs. Schmidt notes the average length of the whole catch as 40 and 32.3 cm. respectively for the two localities, and though the average catch per trawl hour was the same for both (about 44 kilos), there were about 53 large plaice per trawl hour taken in Skjálfandi Bay as against about 107 smaller fish in Faxe Bay. The weight per fish is thus inversely proportional to the number of specimens for the two grounds. For the size of plaice in Skjálfandi Bay, reference may be made to Appendix Tables XVIII ff., from which it will be seen that the average length for depths about 20—40 metres is about 35—40 cm., while farther inshore, at about 7—15 metres' depth, it is about $32^1/_2$—34 cm. for the years covered by the investigations since the war.

As to the bathymetrical distribution of plaice on the North Coast we have practically only observations from Skjálfandi Bay in the years 1924—27. In summer, then, we have here often a dense stock of large plaice collecting quite close

in to land[1]), but the stock decreases rapidly out towards the deeper water of low temperatures, as will be seen from the subjoined general survey of the number of plaice per hours' trawling from the different depths. All material from the depths in question has been taken under one head for all four years (1924—1927); as already noted, the catches were made between July 14th and August 16th.

[47].

Depth in metres	No. of plaice pr. trawl hour, "Dana" 1924—1927. (No. of hrs. noted in brackets)
about 7—15	*153.6* ($5^1/_3$ hrs.)
— 20—50	*39.7* (36 hrs.)
— 50—90	*12.8* ($2^1/_2$ hrs.)
— 110	*0.0* ($^1/_2$ hr.)

In 1925, the "Explorer", working with the Commercial Otter Trawl on June 15th up in the bay, took in an hour's haul at a depth of 18 metres (66°01′ N. 17°24′ W.), 261 plaice (95 males + 166 females; length 25—59 cm., average 37.08 cm.) and at a depth of 37 metres (66°02′ N. 17°30′ W.) 42 plaice (16 males + 26 females; length 32—51 cm., average 40.76 cm.). These two hauls were made from one to two months earlier than the "Dana" catches, but we find nevertheless that the plaice are already at that season in 1925 numerous in the shallower water.

Decrease in number of plaice, numerical proportion of sexes etc.

When fishing the innermost grounds, the "Dana" was brought up into the shallowest water it could safely work, the depth for the most part being doubtless about 8—10 metres. In most years when research vessels or trawlers have been working here, a dense stock was found in the shallow water, but this is not always the case, as there can evidently be great fluctuations from year to year. Taking the records for Skjálfandi Bay, we find that in 1924 to 1927, the following fluctuations in quantity (from July 14th to August 16th) were observed; the quantities have been transposed into numbers per trawl hour; most of the hauls at depths from 7—15 metres were of only half an hour's duration, as the distance was not great enough for a longer haul, it being impossible to turn without getting into deeper water.

[48].

Year	No. pr. trawl hr., depth abt. 7—15 m.	No. pr. trawl hr., depth abt. 20—50 m.
1924	1251	53
1925	492	29
1926	83	10
1927	8	26

The marked decrease in the quantity of plaice is most obvious in the shallowest grounds, but also met with, though not so pronounced, in deeper water. The

[1]) It is not always, however, that the youngest age-groups are lacking here; they were abundantly represented, for instance, in 1903; see Fig. 74, p. 167, in Rapp. et Procès-Verbaux XXXIX, 1926.

cause of it is not altogether clear. It is possible, with such a restricted area as here in question, that the fishery itself, in conjunction with migration, might bring about such a result. Icelandic and Danish fishermen, using nets and Danish seine, have worked here, more especially, it would seem, in 1924 and 1927.

In 1924, at the end of July, the "Dana" marked 235 plaice here; about 19 per cent. were taken in the course of the first three months after liberation, about 16 per cent. or more by Icelandic boats in the bay itself; the total of recaptures up to now amounts to about 46 per cent. of the 235 fish; about 17 per cent. had left the bay and were taken either on the banks along the North Coast or on the North-west Coast; a very few here and there farther south. The fishery and migration together have thus drawn off about 50 per cent. of the stock, according to this experiment; and there has evidently been no corresponding immigration to maintain the level of the stock.

It does not seem as if the bottom temperature of the bay itself could have been a determining factor for the decrease in number of plaice, as there is no great variation discernible in the figures for 1924—27 in the bay; the following bottom temperatures were registered in shallower and somewhat deeper water.

[49]. Bottom temperatures in Skjálfandi Bay 1924—1927.

1924.	July 27th.	*7.43°* (depth 7.5 m.),	*5.84°* (depth 45 m.).
1925.	Aug. 11th.	*6.42°* (depth 33 m.).	
1926.	July 16th.	*7.06°* (depth 24 m.).	
1927.	July 14th.	*7.79°* (depth 20 m.).	August 16th. *7.89°* (depth 11 m.), *6.68°* (depth 30 m.)

It might be imagined, however, that the plaice did not congregate during the last 2—3 years to such an extent in the bays on the North Coast, but were more dispersed on the banks along the North Coast, also out in deeper water, owing to the fact that warmer water layers have during the last few years, especially 1926[1]) appeared in greater volume along the North Coast than has probably been the case for a long period. How far the quantity of food may have contributed to the decrease in quantity of plaice we do not know.

The proportion between the two sexes of plaice in Skjálfandi Bay has, during the years 1924—27, altered very considerably, as will be seen from the figures below, comprising all sex-determined specimens taken by the "Dana" on the actual trawling grounds in the bay.

[50].

Year	Total number of specimens sex-determined	Percentage of females
1924	1290	64.7
1925	421	61.3*)
1926	148	56.1
1927	218	49.5

*) The "Explorer" had in the same year, a couple of months earlier, about the same, viz. 63.3 per cent. females.

[1]) Cf. Rapp. et Procès-Verbaux XLI, 1927, p. 144—145.

It will be seen that in 1924 there is a maximum of females; the number of these, however, decreasing gradually until in 1927 it amounts to the percentage noted e.g. at the localities investigated on the South Coast (se p. 37).

The number of large fish was, in 1924 and 1925, still fairly high, as in other localities which had enjoyed a period of rest during the war; in the last few years, however, there has been a relatively marked decrease in the number of these large fish. This will be seen from the following figures, being the percentages of both female and male over 45 cm. calculated from the total catch of females and males respectively from depths over about 20 metres, where we find these sizes.

[51]. Skjálfandi Bay:	1924	1925	1926	1927
Females; percentage of total over 45 cm.....	18.7	18.3	12.8	8.5
Males; percentage of total over 45 cm.....	3.4	1.7	0.0	0.0

Since the males move to the spawning grounds earlier than the females, and do not on the whole attain so great a size, a period of rest such as that occasioned by the war would lead to the accumulation of a stock of large old females. That these are now disappearing here is due to the fishery itself, to emigration, and to lack of sufficient immigration.

The fall in the percentage of females may possibly partly be due to the fact that the high temperatures about 1926 off the North Coast of Iceland caused more females than usual, and especially the largest and oldest, to leave the feeding grounds of the North Coast and move towards the spawning grounds[1]). It must also be borne in mind that the feature here noted, of a general decrease in the number of plaice as a whole, and especially in that of the females, may, on this coast particularly, be due to fluctuations in the amount of pelagic fry annually brought to the area in question. For in this part of the Icelandic waters, as on the East Coast, presumably little spawning takes place, and the stock is therefore chiefly maintained by supplies of young fry from West Iceland, brought by the current, which in summer sets eastward along the North Coast. Should those year-classes which in 1924 predominated in Skjálfandi Bay have been especially abundant as pelagic fry, and the corresponding supplies in subsequent years have been considerably poorer, this would result, some years later, in a pronounced fall in the number of adult fish, as the mature individuals gradually moved away to the spawning grounds on the West Coast. And since the males of any year-class generally leave earlier than the females of that year-class, there would come a time when the percentage of females was high, falling thereafter as normal equilibrium was restored.

Age-composition and fluctuations.

Appendix Tables XV—XXV show, as mentioned, the material dealt with from here; we have, however, in this part of the Icelandic waters, included some hauls made with the eel hand seine close in to shore, near the trading station of Húsavík. The reason

[1]) As will be seen from the Tables [52—53], p. 75, the percentage of older fish of 9 years old or more, shows a marked decline from 1924 to 1927.

for including this material was that the stock of plaice here lies closer up inshore than elsewhere in Icelandic waters investigated, so that at a depth of only about 7—10 metres we may encounter a stock of fish averaging 33—34 cm., with not a few specimens over 40 cm. and more than 6—7 years old. Without including material from hauls made with the eel hand seine it would therefore be some years before we could procure, from these waters, representative trawl material of one of the youngest year-classes which on the South Coast already in 1927 appeared in considerable numbers in the trawl catches.

The above-mentioned shifting of the stock closer in to shore would seem, at a first glance, to be due to temperature, as in North Iceland, at this time of year, the plaice find higher temperatures in this shallow water up in the bays than even a short distance out; probably also, they find food more abundant there. Samples from the cold East and South-east Coasts, however, show that the III—V-groups may be numerous here out at depths of about 30—40 metres in July. The cause lies rather in a combination of temperature and local conditions as to depth, which here in Skjálfandi Bay falls rapidly to 150—200 metres.

It is evident from the following pages that in 1926—27 there is a tendency towards greater relative frequency of the younger year-classes, less of the old, while at the same time, as shown in the preceding pages, the actual number of plaice has greatly decreased and the vertical distribution in point of numbers seems to be changing rather from what it was in 1924—25. The whole situation as to the stock of plaice in the bay appears to be undergoing a change just now. This may, as already mentioned, possibly be due to the period of rest during the war and the subsequent resumption of the fishery, which would thus be rather late here in taking effect; however, other factors may, as mentioned, also be held responsible for the changing conditions; a question which continued investigations probably will be able to decide.

The tables below, [52—53], are arranged like those on p. 61 from Faxe Bay, and show the strength of the separate year-classes in percentages. Values over 10 are italicised in the tables.

It will be noticed that despite the relatively slight depth, the two tables show a stock consisting almost exclusively of old fish, 5 years or more. In Faxe Bay, the IV-group is fairly numerous at depths from 30—40 metres, whereas here, in Skjálfandi Bay, in about 10 metres of water, it is poorly represented in most years, and this even when the year-class itself is fairly abundant on the North Coast; it will be seen, for instance, that the 1920 year-class, which as the IV-group in 1924 hardly appears on the trawling ground, is numerous as the V-group in 1925.

Furthermore, on comparing these tables with those from Faxe Bay (p. 60), it will be seen that in Skjálfandi Bay, in 1924—26, there are not a few plaice of the VIII-group and those beyond; we may indeed, find up to 45 per cent. of these groups at a depth of about 20—50 metres where the corresponding figure for Faxe Bay would be only about $2^1/_2$—7 per cent.; there is thus a great difference between the two localities where the same depths are concerned. Up in the shallower water,

however, (7—15 metres) we find, in Skjálfandi Bay, a state of things more resembling those of the trawling grounds in Faxe Bay; fish of the VIII-group and those beyond are here few in numbers, the dominant age-groups being V—VI (IV—VII).

Percentage of the different age-groups in Skjálfandi Bay 1924—27.

[52]. About 7—15 metres depth.

Age-group:	III	IV	V	VI	VII	VIII	IX	X+	Total number of specimens investigated[1])
1924, July 27th	..	4.8	*32.4*	*49.8*	4.8	3.9	1.0	3.3	207
1925, August 11th	..	3.0	*48.5*	*33.3*	*13.1*	0.4	0.0	1.7	237
1926, July 16th+31st	..	*25.0*	*18.8*	*38.8*	*12.5*	5.0	0.0	0.0	80
1927, July 14th, August 16th.[2])	..	..	..	..	..	...	..	..	(12)

[53]. About 20—50 metres depth.

Age-group:	III	IV	V	VI	VII	VIII	IX	X+	Total number of specimens investigated[1])
1924, July 27th	..	0.8	4.6	*31.8*	*18.0*	*25.1*	8.4	*11.3*	239
1925, August 10th—11th	..	1.3	*13.1*	*30.6*	*30.6*	5.6	5.0	*13.8*	160
1926, July 16th+27th	..	1.8	7.3	*18.2*	*27.3*	*34.5*	1.8	9.1	55
1927, August 16th	1.3	*12.3*	*37.0*	*26.0*	*14.9*	3.3	3.3	1.9	154

[1]) Specimens indeterminable not included.

[2]) Only 12 specimens were taken at this depth in 1927 (July 14th and August 16th) in three trawl hauls; these twelve fall to the various age-groups as follows: III: 2, IV: 2, V: 2, VI: 3, VII: 2, X+: 1.

The graph fig. 21, p. 76 brings out more clearly the dominant year-classes in Skjálfandi Bay than the tables themselves. We have also included in the figure the above-mentioned hauls with the eel hand seine at Húsavík (from 6 metres' depth to land) as these form a useful supplement to the trawl catches. For 1925, however, we have no eel hand seine material, and for 1927 only very little from the trawling station at 7—15 metres' depth.

The number of plaice of the different year-classes calculated as catch per hour's trawling varies to an altogether remarkable extent from year to year, in accordance with, and in consequence of, the general decrease in numbers of plaice throughout these four years. This applies, of course, more particularly to the shallow water of about 10 metres' depth. In 1924 and 1925, the numbers of the separate year-classes in the shallow water are very considerably above those for the trawling grounds in Faxe Bay, whereas in 1927, in the shallow water, and in all years at depths about 20—50 metres, the figures are as a rule below those for Faxe Bay. This will be seen from the two tables p. 77 and Table [42], p. 62.

As to the representation of the different year-classes in the bay, it will thus be seen that the year-classes 1916—1920 must have been better in this place than the following year-classes. The 1918—20 year-classes at any rate show no deficiency as regards the supply of young fry in the years 1918—20; the low values for the following three year-classes in the samples, however, might perhaps be interpreted as due to lack of such supplies. The 1921 year-class is rather poor. The 1922 year-class is not rich in number of individuals, but nevertheless rather prominent in

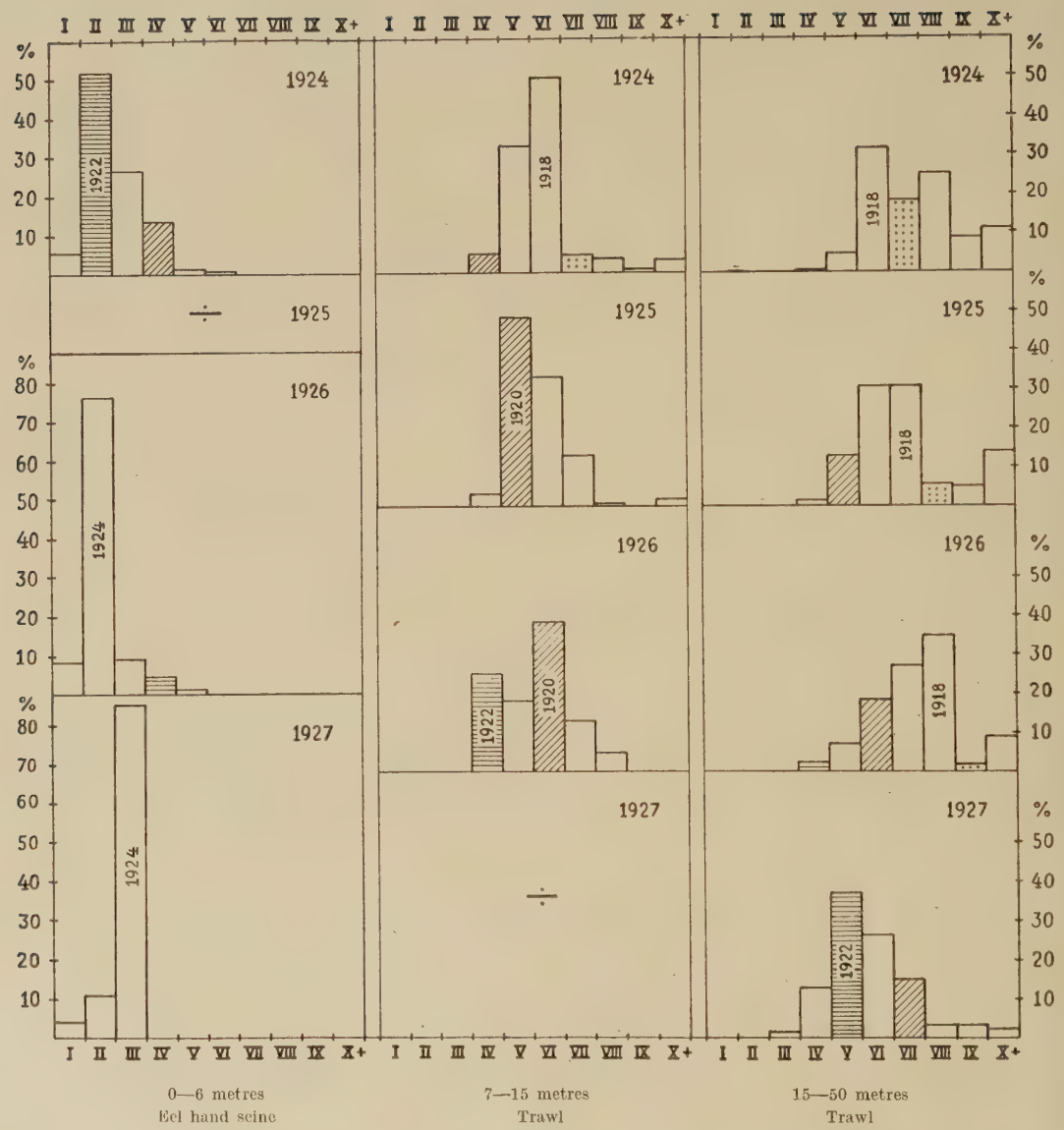


Fig. 21. Percentages of the different age-groups in Skjálfandi Bay, North Iceland, for four successive years. Cf. Fig. 18, p. 63. ÷ = not sufficient material available.

the relative composition of the stock; whether it really was poor in number of individuals on the whole North Coast cannot be determined from the material available. The 1923 year-class seems, from the graphs and tables, to have been poor here as in other parts of the Icelandic waters. The 1924 year-class, on the other hand, looks promising in Skjálfandi Bay, as will be seen from the eel hand seine hauls (Fig. 21); in previous years, the III-group was not numerous in these hauls, but in 1927 it is very distinctly so,

(about 85 per cent.) while the I—II-groups, which otherwise generally make up the greater part of these hauls, are now but poorly represented (cf. also Fig. 6, p. 21). The 1924 year-class is thus perhaps better represented in North Iceland than on the West or South Coasts; owing to migrations, however, this year-class will later on play an important part in the stock of plaice fished on the West Coast.

Numbers per trawl hour for the different year-classes in 1924—1927.

[54]. About 7—15 metres depth.

	Total no. pr. trawl hour	Year-class 1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
1924	1251	13	50	63	*625*	400	63	..	..	..	..
1925	492	..	..	3	64	162	*241*	15	..	..	..
1926	83	..	..	..	4	11	*32*	15	21	..	..
1927	8[1])	..	..	..	..	..	1	2	1	1	1

[1]) Total from here only 12 specimens in $3 \times {}^1/_2$ hours trawling.

[55]. About 20—50 metres depth.

	Total no. pr. trawl hour	Year-class 1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
1924	53	4	13	10	*17*	3	..	..	..	..	..
1925	29	..	2	2	*9*	*9*	4	<1	..	..	..
1926	10	..	..	<1	*4*	3	2	<1	<1	..	..
1927	26	..	..	..	<1	<1	4	7	*10*	3	<1

Rate of growth etc.

We have previously (1926, p. 160 f.) mentioned, very briefly, the material from 1924, and we have here pointed out, as a peculiarity of this area, that the variants within an age-group lie much closer together than elsewhere, so that the majority of the variants extend only over a range of about 10 cm. whereas in Faxe Bay, and on the more westerly parts of the South Coast, the range of variation is more extensive. This must of course be taken as due to the fact that the winter in these waters, as on the East Coast of Iceland, where corresponding conditions prevail, is long and cold, and growth is therefore restricted to the somewhat brief "summer", during which period, however, it is good.

In the publications of Schmidt (1907) and Sæmundsson (1913) regarding marking experiments with plaice in Icelandic waters, the growth in Skjálfandi Bay is estimated — with all reserve, on account of the paucity of material available — at about 3.5 cm. per annum, which is less than in Faxe Bay (about 6 cm.) but more than for the East Coast, Vopnafjord (about 2.3 cm.); these figures are for plaice of similar length to those dealt with in the present work (about 30—40 cm.). The present investigations will of course, as mentioned in the previous chapter, not suffice to decide the question as to rate of growth as a whole; this would require individual examination such as only marking experiments can give. We can, however, here study the conditions as regards size of fish on the same ground from year to year, and also compare the sizes of the age-groups here with those observed on other parts of the coast of Iceland, where trawling has been carried out at similar depths. The sorting of the material occasioned by the depth is

in Skjálfandi Bay rather more of a hindrance to these investigations than for instance in Faxe Bay, as it is difficult, when trawling on the former grounds, to be sure of keeping approximately the same depth. This must always be borne in mind in comparisons, e.g. of one year with another.

The Tables [56—57] below, which are arranged in the same way as the corre-

Average length of the principal age-groups in Skjálfandi Bay.

[56]. 1) Depth about 7—15 metres.

Year-class	1924 July 27th	1925 August 11th	1926 July 16th and 31th	1927 July 14th and August 16th[1])	Age-group
1915	—				
1916	—	—			
1917	39.1	—			
1918	34.9	35.4	(40.5)[2])		
1919	29.8	33.2	36.2	—	
1920	26.8	30.9	35.7	—	*VIII*
1921		(27.3)	32.5	—	*VII*
1922			29.2	—	*VI*
1923				—	*V*
					IV
Average length of sample investigated	*34.03*	*32.56*	*33.72*	[*34.17*]	

[1]) Only 12 specimens taken here this year.

[2]) ( ) denotes average calculated from fewer than 10 specimens.

[57]. 2) Depth about 20—50 metres.

Year-class	1924 July 26th and 27th	1925 August 10th and 11th	1926 July 16th and 27th	1927 August 16th	Age-group
1915	43.7				
1916	41.5	(43.6)			
1917	39.3	(42.7)			
1918	36.5	38.5	40.5		
1919	33.8	35.5	36.7	(44.8)	
1920		33.0	37.0	38.5	*VIII*
1921			(32.0)	35.8	*VII*
1922				33.5	*VI*
1923				30.2	*V*
					IV
Average length of sample investigated	*40.18*	*38.62*	*38.68*	*35.20*	

sponding tables on p. 65, show that the average length of the total catch in shallow water does not vary greatly from one year to another; there is at any rate no conspicuous decrease; this we do find, however, in the total catch from deeper water, and it is due to the fact, as mentioned above, that the large fish especially have disappeared. It is chiefly the old fish that gradually fall away, as is evident *inter alia* from the fact

that the average length for groups IV—VI does not on the whole exhibit any marked decline. It will further be seen from the tables that the difference between average lengths of the age-groups in each year's catch, as also the difference between the average lengths of a particular year-class in two successive years lies as a rule between 2 and 4 cm.

In order to illustrate the sizes of the age-groups in Skjálfandi Bay as compared with those in other places, we have selected, in the tables given below, the V- and VI-group from the material available, not only from Skjálfandi Bay and Faxe Bay, but also from East and South Iceland. These two groups (V and VI) were chosen as being best suited to the purpose of all those represented, the others being often lacking in one or another part of the waters concerned (see tables in Appendix). In the main, however, all groups exhibit the same features as those selected.

[58]. Average length of the V-group.

	1924	1925	1926	1927
West Iceland:				
Faxe Bay, intraterritorial, 30—40 m., abt. July 1st—August 1st.	30.8	28.4	30.1	31.4
North Iceland:				
Skjálfandi Bay, 20—50 metres, abt. August 1st	33.8	33.0	(32.0)	33.5
— — abt. 7—15 metres, abt. August 1st.....	29.8	30.9	32.5	—
East Iceland:				
Hjeradsflói, 30—40 metres, 2nd half of July	30.2	—	—	29.0
South-east Iceland:				
Lónsvík. 36—43 metres, July	—	30.3	—	28.9
South Iceland:				
Landeyjasandr, 25—65 metres, abt. July 1st.....	—	36.3	—	36.5

[59]. Average length of the VI-group.

	1924	1925	1926	1927
West Iceland:				
Faxe Bay, intraterritorial 30—40 m., abt. July 1st—August 1st	33.2	29.7	31.7	33.4
North Iceland:				
Skjálfandi Bay, 20—50 metres, abt. August 1st	36.5	35.5	37.0	35.8
— — abt. 7—15 metres, abt. August 1st.....	34.9	33.2	35.7	—
East Iceland:				
Hjeradsflói. 30—40 metres, 2nd half of July.....	30.9	—	—	31.6
South-east Iceland:				
Lónsvík. 36—43 metres, July	—	—	—	30.9

(Landeyjasandr, in western South Iceland, is here omitted, but little material of this group being found here, as in other parts of South Iceland proper.)

It will be seen that in Skjálfandi Bay, the plaice of the same group in the years 1924—27 are larger than those from corresponding depths in Faxe Bay; the size of the plaice from shallow water in Skjálfandi Bay on the other hand more approaches that of the Faxe Bay fish (and, as mentioned on p. 75, the age-composition of the stock here is also more like that of Faxe Bay). On the extraterritorial trawling grounds of Faxe Bay, however, where the plaice are about 2 cm. larger than those of the intraterritorial ground, we find a stock resembling more or less in point of size that

met with in Skjálfandi Bay at corresponding depths. The age-composition on the other hand, differs in most years not a little as between these two localities.

In the main, however, as will be seen, the average length of the age-groups in Skjálfandi Bay is somewhat greater than in Faxe Bay. But it must here be borne in mind that investigations with regard to marked plaice from this part of Iceland and to other fish (cod, haddock, halibut etc.) have shown that the growth is inferior in the North Iceland waters as compared with the West. We must then, until we have a more extensive series of observations, covering moreover, a greater number of localities than those named both in West and North Iceland, doubtless attribute the state of things here noted to local conditions. And it will be natural to suggest, for these, firstly the bathymetrical differences between the two bays, and further, a difference in time of migration in the two localities in regard to age and size of the fish (later and of a greater length in North Iceland than in the West). That the growth of the plaice at any rate during the first years of life is more rapid in certain parts of Faxe Bay than in Skjálfandi Bay is shown by some hauls made with the eel hand seine in like manner and at like depths (from about 6 metres in to shore), some at Havnefjord, near the intraterritorial trawling ground in Faxe Bay, and some at Húsavík near the trawling ground in Skjálfandi Bay.

The following average lengths are recorded from these two localities in 1924 and 1926 for the II- and III-groups:

[60]. Eel hand seine, abt. 6—0 metres. Average length in centimetres.

		II-group	III-group
1924.	Havnefjord, June 14th.....	*12.9* (32)[1])	*17.9* (36)
	Húsavík, July 26th.....	*10.4* (141)	*16.1* (72)
1926.	Havnefjord, June 25th.....	*15.1* (67)	*21.9* (51)
	Húsavík, July 17th.....	*11.6* (198)	*19.1* (24)

[1]) No. of specimens investigated in brackets.

It will be seen that though the catches from Húsavík were made a month later than those from Havnefjord, the fish are nevertheless throughout abt. 2—$3^1/_2$ cm. smaller at Húsavík than the corresponding ones from Havnefjord.

Comparison of the plaice in Skjálfandi Bay with those from East Iceland and those from the western part of South Iceland shows, as will be seen from the selected samples of the V- and VI-groups, (Tables [58—59], p. 79) that the plaice of the East Coast are smaller than those of the North Coast, these again, however, being smaller than those of the western South Coast. A similar state of things prevails in regard to the other age-groups, as far as can be seen from the material given at the end of the work, though all groups are not equally well represented.

4. GENERAL REVIEW OF THE AGE-COMPOSITION, FLUCTUATIONS AND RATE OF GROWTH IN THE STOCK OF PLAICE.

Age-composition.

The material dealt with in the foregoing is, as mentioned, taken from some selected grounds on the four coasts of Iceland in 1924—27. It affords information as to the stock of plaice in Icelandic waters in regard to two principal points of interest from the point of view of fishery-biology, viz. fluctuations in the year-classes and growth on the different coasts. We still, however, know far too little as to the distribution of the different age-groups in the stock of plaice in Icelandic waters, as regards locality (including depth) and time of year; also as to details of growth of these groups in the widely dissimilar grounds in enclosed fjords and open bays and off the coasts.

In the present work, comparison has chiefly been made between grounds lying inside the territorial limit, at depths about 10—50 metres; and the different samples enable us to follow the stock of plaice which the fishery has already begun to draw upon, or which will, in the years immediately following that in which the samples were taken, be subjected to commercial fishery.

[61]. Percentage of the different age-groups in various depths.

North and South Iceland.

Area & Depth	II-gr.	III-gr.	IV-gr.	V-gr.	VI-gr.	VII-gr.	VIII-gr.	IX-gr.	X+
North Iceland. *1924*									
7—10 m.	..	..	4.8	*32.4*	*49.8*	4.8	3.9	1.0	3.3
20—50 m.	..	..	0.8	4.6	*31.8*	*18.0*	*25.1*	8.4	*11.3*
1925.									
7—10 m.	..	..	3.0	*48.5*	*33.3*	*13.1*	0.4	..	1.7
19—34 m.	..	..	1.3	*13.1*	*30.6*	*30.6*	5.6	5.0	*13.8*
1926.									
7—15 m.	..	..	*25.0*	*18.8*	*38.8*	*12.5*	5.0	..	..
20—38 m.	..	..	1.8	7.3	*18.2*	*27.3*	*34.5*	1.8	9.1
1927.									
9—20 m.	..	—	—	—	—	—	..	..	—[1])
15—35 m.	..	1.3	*12.3*	*37.0*	*26.0*	*14.9*	3.3	3.3	1.9
South Iceland. *1925.*									
24 m. St. 47.	..	*97.2*	2.5	0.3	..	..	..	..	..
31 m. St. 48.	..	*64.8*	*30.2*	1.2	0.5	0.9	0.4	0.7	1.2
39 m. St. 49.	..	*59.8*	*36.8*	2.8	..	..	0.3	0.3	..
45 m. St. 43.	..	*91.0*	6.0	1.3	1.3	..	..	0.4	..
65 m. St. 40.	..	*56.6*	*23.9*	5.3	6.2	1.8	5.3	..	0.9
1927.									
15—30 m. St. 3071.	..	*11.0*	8.4	*75.3*	4.3	1.0	..	..	..
25—43 m. St. 3156.	..	*19.0*	*14.1*	*52.2*	9.2	3.3	1.6	0.6	..
36—43 m. St. 3075.	..	..	1.9	*76.5*	*12.8*	1.9	1.9	..	4.9
20—48 m. St. 3066.	..	9.4	*18.8*	*54.7*	4.7	6.2	..	..	6.2
20—60 m. St. 3069.	0.3	*30.1*	3.7	*62.2*	3.1	0.6	..	..	..

[1]) See p. 75.

The frequent abrupt changes of level off the coasts of Iceland render investigation difficult, in regard to the biology of this species in particular, and the lack of narrowly restricted bathymetrical areas for the separate catches involves a weakness in the material dealt with which renders comparison rather uncertain. Other features may also play a part; the investigated area in North Iceland, for instance, differs from South Iceland in the fact that the stock of old plaice, in summer at any rate, congregates closer inshore in restricted areas, and differences of depth in trawling will therefore produce greater alteration in the percentages of the age-groups in catches from North Iceland than in South Iceland, as will be seen from Table [61] p. 81; samples from South Iceland thus doubtless give a truer picture of the actual conditions in regard to composition of the stock in the depths in question on this coast than do those from Skjálfandi Bay of the conditions on the North Coast.

A general survey of the percentage distribution of age-groups round the coasts of Iceland is given in Table [62]. The material is all from intraterritorial waters, and for the most part from about 20—50 metres depth, though this may have varied slightly from somewhat below to somewhat above these limits during trawling. Owing to the peculiar conditions prevailing in North Iceland, to which reference has already been made in the foregoing, Table [62] should be compared with that given p. 81.

[62]. Percentage of the different age-groups round Iceland 1924—27.

Depth abt. 20—50 metres.

Area	II-gr.	III-gr.	IV-gr.	V-gr.	VI-gr.	VII-gr.	VIII-gr.	IX-gr.	X+
1924.									
West Iceland.....	..	1.4	19.8	21.8	21.4	*30.2*	3.2	1.9	0.3
North Iceland.....	..	..	0.8	4.6	*31.8*	18.0	25.1	8.4	11.3
East Iceland.....	6.3	20.0	*37.5*	16.3	17.5	2.5	..	..	..
1925.									
South Iceland.....	..	*78.4*	18.0	1.4	0.7	0.4	0.4	0.3	0.4
West Iceland.....	..	9.8	28.2	*46.9*	8.2	4.5	2.4	..	..
North Iceland.....	..	..	1.3	13.1	*30.6*	*30.6*	5.6	5.0	13.8
1926.									
West Iceland.....	..	2.2	14.2	25.9	*43.9*	6.7	2.9	3.7	0.5
North Iceland.....	..	..	1.8	7.3	18.2	27.3	*34.5*	1.8	9.1
1927.									
South Iceland.....	0.1	17.3	7.9	*66.1*	5.6	1.7	0.4	0.1	0.8
West Iceland.....	..	7.9	18.2	*29.1*	22.0	16.8	4.5	0.5	..
North Iceland.....	..	1.3	12.3	*37.0*	26.0	14.9	3.3	3.3	..
East Iceland.....	..	0.3	2.1	*80.4*	14.8	2.1	0.3	..	..

The prominent age-groups in each of the separate areas are italicised in the table above, and it will thus be seen that any one of the age-groups from III to VIII may appear as the strongest on some part of the coast of Iceland during the years 1924—27; a distinct difference is, however, apparent as we move round the coast.

[63]. Dominant age-groups round the coasts of Iceland.

South Iceland	the	III—V groups are the strongest
West Iceland	-	IV—VII — - - —
North Iceland	-	V—VIII — - - —
East Iceland	-	IV—V — - - —

The samples taken from more or less the same depths during the four years covered by the investigations thus show that in South Iceland, there is on the grounds in question a stock of younger plaice, in West Iceland one of rather older fish, and in North Iceland a stock of old ones, the age-groups beyond the VII-group bulking largely here in 1924, 1925 and 1926. In the case of East Iceland, the stock in the two years from which material is available (1924 and 1927) consisted of younger plaice, as in South Iceland, which point to the possibility that the East Coast, at any rate in certain years, draws its supplies for the most part directly from the South Coast.

The stock of plaice in Skjálfandi Bay may possibly, in the years 1924—27, still have been subject to the alterations which took place elsewhere during the years immediately after the war, and which in Faxe Bay for instance, and in South Iceland, appear to have come to an end at the time when investigations were resumed after the war, in 1924. If so — and future investigations will probably decide the point — then a comparison of the stock in Skjálfandi Bay, North Iceland, with that of the other localities investigated will be interesting as showing a relatively untouched stock in these waters compared with one that is fished, and the gradual transition from the one category to the other.

The stock on the international trawling grounds is recruited largely from the areas investigated, and the fishery in South Iceland must therefore take on the whole younger plaice than in West Iceland; and here again younger fish than in North Iceland. In South and West Iceland, however, there is an immigration of mature plaice from the East and North Coast, as has been shown by marking experiments; these immigrants belong for the most part to older age-groups than the fish which have grown up in the waters of South and West Iceland, and the percentage of older fish is thus rendered higher on the spawning grounds in South and West Iceland than would otherwise have been the case.

Fluctuations.

The fluctuations within the year-classes will be seen from the various tables and graphs given for the series of localities investigated on the different coasts of Iceland (cf. p. 38, p. 60 f., p. 75 f.).

The little table below is designed to show those year-classes which have proved stronger than the rest; we must, however, here disregard the 1919 year-class and those older than this, as the material from South and to some extent also from

East Iceland is not extensive enough to give the requisite certainty in regard to these year-classes. The sign + denotes that the year-class was strong, — that it was weak; signs in brackets mean weaker or stronger than the signs + and — respectively without brackets.

[64].

	Year-classes:				
	1920	1921	1922	1923	1924
South Iceland	—	(+)	+	—	(+)
West Iceland	+	+	+	(—)	+
North Iceland	+	(—)	(+)	—	+
East Iceland	+	(+)	+	—	?

It will be seen that the 1920 year-class was strong towards the west, north and east, but was not to be traced in any quantities on the South Coast, where, as the V-group, it should have been able to show up in force in one or another of the samples from 1925 if it had been there in numbers corresponding to those of the other coasts; as to this see for instance the material from 1927, Table [22], p. 38, where even the VI-group appears very respectably represented in the material both from Landeyjasandr and Lónsvík, with about 9—13 per cent., whereas the V-group in 1925 — i.e. the 1920 year-class — does not in any sample exceed about 5 per cent. (Table [21], p. 38).

The 1921 year-class was fairly strong, though inferior alike to that of 1920 and 1922. The 1922 year-class was found to predominate all round the coast, and in 1925 could amount to as much as 97 per cent. of certain catches from South Iceland. The 1923 year-class was poor, but somewhat stronger in Faxe Bay than elsewhere; the 1924 year-class on the other hand, as far as we can see up to now, looks like being a strong one.

It must be added that of the year-classes older than the 1920, those of 1919 and 1918 appear, from the investigations, to have been good in those parts from which material of these year-classes is available (west, north, east); the 1917 year-class was probably strong both on the West and North Coasts, and the 1916 year-class in North Iceland. We have not enough material from the other coasts to show the strength or weaknes of these year-classes.

The difference in the distribution of an otherwise good year-class on the different coasts must doubtless be due to the unequal distribution of the pelagic fry by the currents.

In order to bring out clearly the value of the 1922 year-class, the accompanying graph (Fig. 22) is given, from material taken in 1927 at depths of about 20—50 metres on all four coasts. The 1922 year-class was in 1927 the V-group, but in spite of this we find that in South and East Iceland it makes up about 65—80 per cent. of the catch; in West Iceland, the figure drops to something under 40 per cent., and in North Iceland, where a far greater number of year-classes are represented in the catches, the value is down to about 30 per cent. It is possible that the increasing number of "small" plaice in the English trawl catches from Iceland (see p. 7) during the years 1923 to 1926 may have been drawn from the two good year-classes mentioned, 1920 and 1922, and especially

from the latter, which must be supposed to have constituted a great part of the catch on the South Coast during the last few years.

The year 1922 was evidently also a good year for other species of fish in Icelandic waters, as for instance cod, halibut and haddock; as regards the cod, 1924 was also good.

From the preceding statements as to the fluctuations in quantities of plaice in Ice-

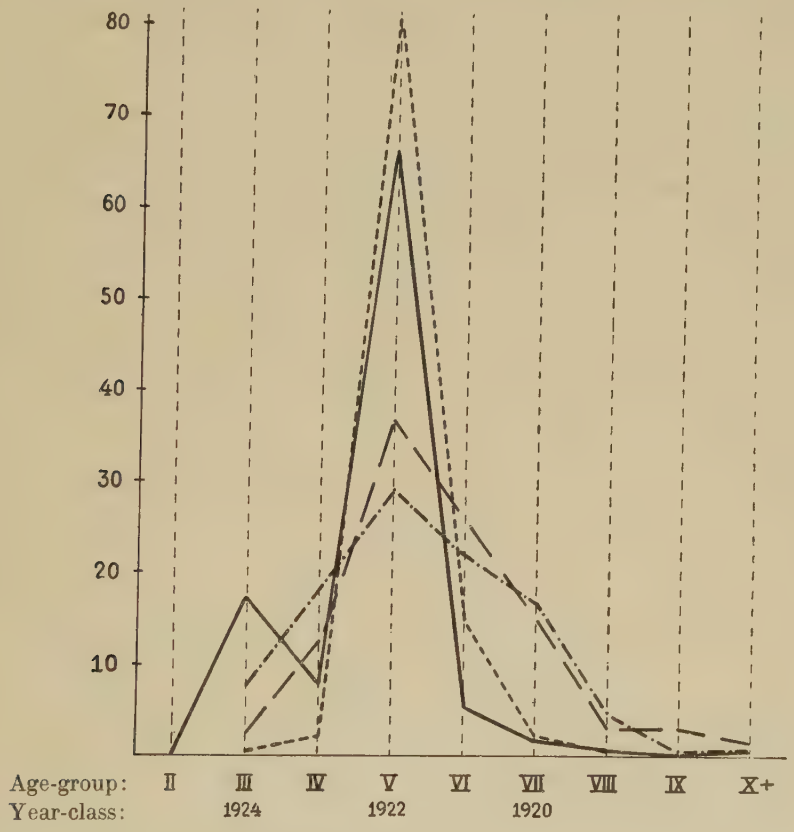


Fig. 22. Percentages of the different age-groups round Iceland in 1927.
——— South Iceland (all samples).
- - - - - - - - East Iceland (Hjeradsflói).
— — — North Iceland (Skjálfandi Bay).
—·—·— West Iceland (Faxe Bay).

landic waters it will be seen that these fluctuations in the year-classes in some years far exceed what is commonly known in more southerly waters; this fact is probably owing to the extreme conditions which the species encounters in these waters on the northern boundary of its range of distribution.

It seems, however, as if similar fluctuations of good and poor years have lately taken place throughout great parts of the whole area of distribution of the plaice.

The work of the last few years in connection with these fluctuations enables us to form a general view of the dominant year-classes in other waters besides those here considered. We have, first and foremost, a series of works dealing with the stock in the southern North Sea, among which I would refer e.g. to Ad. Bückmann's and D. E. Thursby-Pelham's interesting papers 1927 and 1928 as also to A. C. Johansen's statements in the "Fiskeri-Beretning for Aaret 1925" Copenhagen 1926, p. 99. I give below, in the briefest possible form, a summary of the ascertained facts for various localities in the southern part of the North Sea:—

[65].

1920 — a particularly good year (Mielck, Heincke).
— — above the normal number of the year-class (A. C. Johansen, K. Smith).
1921 — above the normal number of the year-class (A. C. Johansen, K. Smith).
— — rich year-class in Leman-Haak's material 1923—25 (Thursby-Pelham).
1922 — an unusually rich year (Bückman, Thursby-Pelham).
— — above the normal number of the year-class (A. C. Johansen).
1923 — bad year (Bückman, Thursby-Pelham).
— — normal (A. C. Johansen).
1924 — rich off the Dutch coast Nov. 1926 (Thursby-Pelham).
— — above the year-class 1922 off Norderney 1926 (Bückmann).
— — poor in the Horns Reef Area (A. Jensen).

From this it will be seen that in the southern part of the North Sea, the 1920, 1921 and 1922 year-classes, with perhaps 1924, were stronger than that of 1923; the 1922 year-class especially predominating, though the 1920 year-class seems also be worth special notice. It is interesting now to observe that precisely this 1922 year-class was, in Icelandic waters, more strongly represented than all the rest in 1927, and as early as 1925 appeared in great strength on the South Coast. The 1920 year-class is also noticeable; 1921 was fairly good; 1923 was poor, and finally, it looks as if the 1924 year-class will be good. This seems to indicate that within the period of years here in question, a remarkable agreement prevails between the Icelandic waters and those of the North Sea in regard to dominance of certain year-classes[1]). It will be necessary, however, to trace the fluctuations in the stock of plaice throughout a longer period in order to ascertain whether there is any real correlation between the variations in numbers of this species in Icelandic waters and those observed in other areas where Atlantic water or other climatic influences may in various ways affect the general conditions in the same direction. The agreement noted does not seem to hold good for all species of fish in these years: Harold Thompson[2]) for instance finds, in regard to the haddock, that the 1920 and 1923 year-classes were poor in Icelandic waters, but very rich in the North Sea, whereas the 1922 year-class was good in Icelandic waters but poor in the North Sea.

[1]) H. Blegvad on the other hand considers that in the inner Danish waters, the 1921, 1923 and 1925 year-classes were best (1927, p. 30 f.). [2]) Cf. foot-note p. 43.

Rate of growth.

With regard to the growth of the plaice in Icelandic waters, an approximate estimate has been formed, from the somewhat restricted marking experiments already made (1903—1909) as to the annual increment. From these individual investigations, the annual growth of plaice about 25—40 cm. length in the localities noted is given as under:—

1) Faxe Bay (West Iceland) — about 6.0 cm.
2) Skjálfandi Bay (North Iceland) — about 3.5 cm.
3) Vopnafjord (East Iceland) — about 2.3 m.

No observations are available from South Iceland, where marking experiments were first undertaken in 1927; we know, however, from the present investigations, that the growth on the western part of the South Coast is better than in Faxe Bay.

The investigations of the present material cannot furnish any accurate measure of the growth increment from year to year; we can, however, especially as regards the South and East Coast, form a rough idea as to the more or less favourable conditions of growth on the extensive range of coast here in question. Taking for instance a few of the best represented age-groups from South and East Iceland we find a very marked decline in the average length as we move from the western part of the South Coast round to the East Coast. The figures below represent the average size in cm.

[66].

III-group (1925).....	31.6	30.8	..	23.9	20.9	20.8	..
V-group (1927).....	36.5	39.7	33.8	31.7	..	28.9	29.0

The decrease in average length of these two age-groups thus amounts to about 10 cm. in this part of Iceland; comparison of the material of other age-groups from the same range of ground reveals in the main the same state of things.

If now, in comparison with this, we proceed to consider the conditions of temperature in the sea along these coasts, it is at once noticeable that the oft-mentioned marked contrast between the warm water of the South Coast and the cold water of the East Coast coincides with the more rapid growth of the plaice on the western part of the South Coast and the slower growth on the East Coast. The present investigations further show that the transition area where the growth of the fish on the South Coast is, directly or indirectly, affected to a considerable degree by the varying hydrographical conditions in the area between the cold water of the East Coast and the warmer water of the South Coast is of no insignificant extent; at Ingólfshøfdi, or even farther west, the growth is already perceptibly reduced in comparison with that on the best part of the South Coast, where the maximal growth of the species in Icelandic waters is recorded.

It may here be added that it is possibly not only the maximal growth of the species in Icelandic waters, but the maximal growth attained by the species anywhere, which is found on the western part of the south coast of Iceland. For even in

those localities in the southern parts of the area of distribution where growth is best, the average length noted for the age-groups near Portland only seems to be reached some months later (cf. works of W. Wallace, C. G. Joh. Petersen, A. C. Johansen and others). In certain Icelandic fjords, a very slow rate of growth is recorded for the youngest age-groups (Tåning 1926, p. 154), but whether this represents the minimum for the species throughout its area of distribution is uncertain.

As with investigations in regard to other species of fish (cod, haddock etc.) it is to be expected that the plaice also will exhibit a higher rate of growth in West Iceland than in North Iceland, thus reproducing here, though perhaps in less marked degree, the conditions of growth observed in South and East Iceland. We have not, however, as yet, a sufficient number of samples from different localities in West and North Iceland to throw light on the question, as the material from the grounds hitherto investigated on these coasts is evidently partly affected by local conditions.

It is difficult therefore, from the present investigations, to state the growth all round the coasts of Iceland, from the spot where the plaice are largest to that where they are smallest within the respective age-groups. We will, nevertheless, make an attempt, at the same time pointing out that owing to the mentioned local conditions, the figures for the samples from Faxe Bay are likely to be lower than they should in order to be properly representative of the West Coast, and on the other hand the figures from Skjálfandi Bay too high for the North Coast as a whole.

The table shows in centimetres the approximate limits of average length for the age-groups III to VII in depths of about 20—50 metres in June—August during the years of investigation.

Average length in centimetres.

[67].

Age-group	South Iceland (Portland-Westmanna Isles)	West Iceland (Faxe Bay)	North Iceland (Skjálfandi Bay)	East Iceland (Hjeradsflói)
VII	(36—44)	33—35	35—39	(35—36)
VI	(35—37)	29—33	33—37	(31—32)
V	36—40	28—31	31—33	29—30
IV	33—37	26—28	27—30	25—28
III	29—31	23—25	(abt. 26)	(abt. 20)

It will be seen that plaice on the South-west Coast reach the same size in their 3rd year as plaice on the East Coast in their 5th year etc.; the coasts between these two extremities exhibit all intermediate stages along the South Coast, and probably the same state of things also holds good along the West and North Coast.

VI. Length and Weight of Icelandic Plaice.

Weighings of Icelandic Plaice were carried out in 1927 at various points all round the coast, viz.:—

South Iceland: Landeyjasandr, Medallands Bay and Lónsvík.
West Iceland: Faxe Bay, both intra- and extraterritorially.
North Iceland: Skjálfandi Bay.
East Iceland: Hjeradsflói.

All the samples were taken by trawling on the grounds frequented in July—August 1927 by the "Dana" (see Tables in Appendix); the weighing was done within 1—3 hours after capture, and is correct within 5 gr. The total number of weighings was about 2250 (Appendix Table XXXIV). The measurements were made according to the rules adopted by the International Council for Exploration of the Sea, and the lengths for the respective weights must therefore be increased by 0.5 to give the value most nearly corresponding to the weight. This has not been done in the table below, as it would have made it more difficult to compare the results with those already recorded in various publications. And in any case, the increase in question, as applied to the average lengths, involves only a reduction in k of about 0.05.

It should further be noted that the greater part of the material consists of immature fish; this applies, at any rate, to practically all under 40 cm. length.

It will be seen from the tables of weights that the average weight for fish of the same length sometimes differs by as much as about 20—30 gr. from one locality to another. Compared with the North Sea, also, the Icelandic weights are nearly always higher (cf. the weight tables in Masterman 1908, 1909, Redeke 1909 etc.). The value of direct comparison between weight values from Iceland and those from elsewhere is, however, rather problematic (see below) and we shall not therefore here give the customary empirical curve for length-weight compared with the corresponding figure for other waters.

The length-weight coefficient k is calculated according to Fulton's formula: $g = \frac{k \cdot l^3}{100}$, which has been employed as furnishing a convenient expression of the proportion between length and weight. The g here stands for weight in grammes, l for length in cm.; the coefficient k is noted by some writers as the "Ernährungskoeffizient"; in Borley 1912 as the "Index of condition"; various objections have, however, been raised against the employment of k as an index of condition (see Duncker 1923, p. 22 f.). In the accompanying list, k is noted for females, for males, and for the total amount of material from each individual locality.

On comparing the k-values for males with those for females it will be seen that there is but slight difference between the two sexes, as also, of course, between these values and those for the total of both sexes. This was naturally to be expected, the majority being, as mentioned, immature fish. Maturity is not reached until a length of close on 40 cm. or over, i.e. at a size larger than that of most of the fish we have here been able to examine.

[68]. Average Length-Weight Coefficient of Plaice from Iceland.

Length in cm.	Females							Males							Total							Length in cm.
	Faxe Bay		Landeyjasandr	Medallands Bay	Lónsvík	Hjeradsflói	Skjálfandi Bay	Faxe Bay		Landeyjasandr	Medallands Bay	Lónsvík	Hjeradsflói	Skjálfandi Bay	Faxe Bay		Landeyjasandr	Medallands Bay	Lónsvík	Hjeradsflói	Skjálfandi Bay	
	Extraterritorial	Intraterritorial						Extraterritorial	Intraterritorial						Extraterritorial	Intraterritorial						
57	..	1.25	..	..	..	..	..	..	..	..	..	..	..	..	..	1.25	..	..	..	..	..	57
56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	56
55	..	..	..	..	1.41	..	..	..	..	..	..	..	..	..	..	..	..	..	1.41	..	..	**55**
54	..	..	..	..	1.42	..	..	..	..	..	..	..	..	..	..	..	..	..	1.42	..	..	54
53	..	..	..	..	..	..	..	..	1.12	..	..	..	..	..	..	1.12	..	..	..	..	..	53
52	..	..	..	..	1.28	..	1.05	..	..	..	..	..	..	..	..	..	..	..	1.28	..	1.05	52
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	51
50	..	1.28	..	..	..	..	1.32	..	..	..	..	..	..	..	..	1.28	..	..	..	..	1.32	**50**
49	..	1.39	..	..	..	..	..	..	..	..	..	1.32	..	..	..	1.39	..	..	1.32	..	..	49
48	..	..	..	..	1.26	..	1.39	..	..	..	..	..	..	..	..	..	..	..	1.26	..	1.39	48
47	..	..	..	..	..	..	1.30	..	..	..	..	..	..	..	..	..	..	..	..	..	1.30	47
46	1.37	1.23	..	1.25	1.29	..	1.46	..	..	..	..	..	..	..	1.37	1.23	..	1.25	1.29	..	1.46	46
45	..	1.28	..	..	..	..	..	..	..	..	..	..	..	..	..	1.28	..	..	..	..	..	**45**
44	..	1.41	..	..	..	..	1.41	..	..	..	..	..	..	..	..	1.41	..	..	..	..	1.41	44
43	..	..	1.19	1.32	..	..	1.37	1.26	1.16	1.07	1.31	..	..	1.06	1.26	1.16	1.15	1.32	..	..	1.21	43
42	1.23	..	..	1.26	..	.	1.28	1.09	1.40	1.23	..	1.27	..	..	1.19	1.40	1.23	1.26	1.27	..	1.28	42
41	1.23	1.22	..	1.20	..	..	1.44	1.50	1.19	1.14	1.15	1.18	..	..	1.32	1.21	1.14	1.18	1.18	..	1.44	41
40	1.19	1.18	1.26	..	1.41	..	1.33	1.17	1.18	1.17	1.23	..	..	1.12	1.17	1.18	1.21	1.23	1.41	..	1.23	**40**
39	1.31	1.21	1.25	1.23	..	..	1.13	1.23	1.15	1.21	1.39	..	..	1.22	1.29	1.18	1.22	1.27	..	..	1.17	39
38	1.27	1.20	1.28	1.21	..	..	1.20	1.24	1.20	1.24	1.23	..	..	1.15	1.26	1.20	1.25	1.22	..	..	1.18	38
37	1.26	1.20	1.19	1.26	..	1.17	1.25	1.23	1.19	1.27	1.20	..	1.16	1.25	1.24	1.20	1.24	1.23	..	1.17	1.25	37
36	1.25	1.18	1.25	1.23	..	1.20	1.24	1.23	1.20	1.19	1.24	1.25	1.20	1.21	1.23	1.19	1.21	1.23	1.25	1.20	1.22	36
35	1.25	1.18	1.24	1.23	..	1.20	1.22	1.26	1.17	1.29	1.27	..	1.16	1.24	1.25	1.18	1.27	1.25	..	1.18	1.23	**35**
34	1.28	1.22	1.29	1.25	1.09	1.17	1.25	1.22	1.18	1.27	1.22	1.13	1.20	1.23	1.25	1.20	1.28	1.23	1.12	1.18	1.24	34
33	1.24	1.18	1.25	1.24	1.04	1.24	1.24	1.24	1.14	1.24	1.22	1.10	1.19	1.27	1.24	1.16	1.24	1.23	1.09	1.20	1.26	33
32	1.27	1.17	1.25	1.23	1.21	1.21	1.22	1.29	1.19	1.28	1.23	1.26	1.21	1.27	1.28	1.19	1.27	1.23	1.24	1.21	1.25	32
31	1.27	1.15	1.33	1.24	..	1.28	1.31	1.26	1.15	1.26	1.21	1.21	1.21	1.32	1.27	1.15	1.30	1.23	1.21	1.24	1.31	31
30	1.31	1.17	1.37	1.21	1.11	1.23	1.26	1.28	1.16	1.37	1.23	1.18	1.20	1.27	1.29	1.16	1.37	1.22	1.15	1.21	1.27	**30**
29	1.25	1.17	1.44	1.27	1.14	1.19	..	1.31	1.15	1.33	1.27	1.18	1.19	1.29	1.30	1.16	1.34	1.27	1.16	1.19	1.29	29
28	1.30	1.12	1.29	1.18	1.23	1.23	..	1.28	1.16	1.30	1.22	1.20	1.20	..	1.29	1.14	1.29	1.20	1.22	1.22	..	28
27	1.04	1.20	1.45	1.29	1.18	1.23	..	1.30	1.17	1.35	1.21	1.23	1.24	1.37	1.24	1.18	1.38	1.26	1.23	1.24	1.37	27
26	..	1.09	1.35	1.25	1.24	1.18	1.42	..	1.14	1.39	1.28	1.30	1.23	..	..	1.13	1.37	1.27	1.28	1.20	1.42	26
25	1.25	1.15	1.34	1.28	1.18	1.21	1.34	1.12	1.17	..	1.31	1.34	1.20	1.34	1.18	1.16	1.34	1.29	1.29	1.20	1.34	**25**
24	1.16	1.23	1.30	1.24	..	1.15	..	..	1.23	1.56	1.26	1.21	1.28	..	1.16	1.23	1.43	1.25	1.21	1.23	..	24
23	..	1.20	..	1.23	..	..	..	..	1.21	..	1.32	..	1.23	..	..	1.21	..	1.28	..	1.23	..	23
22	..	1.21	..	1.27	..	..	..	..	1.18	..	1.30	..	..	..	..	1.20	..	1.29	..	..	..	22
21	..	1.19	..	1.25	..	..	..	1.35	1.21	..	1.24	..	..	..	1.35	1.20	..	1.25	..	..	..	21
20	..	1.22	..	1.31	..	..	..	..	1.25	..	1.32	..	..	..	..	1.24	..	1.32	..	..	..	**20**
19	..	1.21	..	1.22	..	..	..	..	1.28	..	1.39	..	..	..	..	1.25	..	1.25	..	..	..	19
18	..	1.24	..	1.29	..	..	..	..	1.26	..	1.29	..	..	..	..	1.25	..	1.29	..	..	..	18
17	..	1.42	..	1.22	..	..	..	..	1.32	..	1.37	..	..	..	..	1.34	..	1.30	..	..	..	17
16	1.34	1.42	..	..	..	..	..	..	1.40	..	1.59	..	..	..	1.34	1.42	..	1.59	..	..	..	16
15	..	1.48	..	1.41	..	..	..	..	..	..	1.19	..	..	..	..	1.48	..	1.33	..	..	..	**15**

On considering the values for k from localities on the South and East Coasts, it will be seen that the figures for Landeyjasandr are somewhat higher than those for the next three places noted; this corresponds with the fact that the length increment decreases with decreasing temperature from the first-named locality to those farther east (cf. Chapter IV, p. 43 f.). The decrease in question, however, does not necessarily imply any causal connection with the conditions of temperature on the South Coast, as the density of the plaice on the trawling grounds investigated is lowest at Landeyjasandr, and the higher k-value might thus be due to individuals there having easier access to a greater abundance of food than on the more easterly grounds. The question will therefore require a far more extensive supply of material from a greater number of localities.

The sample from Skjálfandi Bay was taken rather later in the summer than the others, and this may probably explain why the values from here are higher than for instance those from Hjeradsflói, which is also situated in the colder part of the Icelandic waters; it being assumed that here, as elsewhere, the k-value rises in the course of summer and autumn.

Comparison of the samples from Faxe Bay is particularly interesting. We find here that the values for the extraterritorial trawling grounds are distinctly higher than those for the intraterritorial grounds. This may be due to difference in the density of the plaice inside and outside the territorial limit, but may also be explained by a difference between the two grounds in respect of the food material available (see Spärck 1929, p. 12). For on the extraterritorial grounds, *Mactra* forms an important item in the food of the plaice, as on the Dogger Bank, where Borley (1912, p. 103) finds a high value for k, whereas on the intraterritorial grounds in Faxe Bay we find mainly a typical *Macoma calcarea* community.

The nature of the food is undoubtedly of great importance to the length-weight coefficient; the density of the plaice — i.e. the number of population relatively to amount of food — is, however, probably the most important factor; and also more so, evidently, than the local temperature. That is to say, in the case here recorded from Icelandic waters, more important than whether the grounds are situated in a colder or warmer part of the area as a whole. On considering the extraterritorial grounds of Faxe Bay together with Landeyjasandr and Skjálfandi Bay, as compared with the other localities, where the plaice were far more densely congregated at the time of these investigations, it seems evident that the density of population exerts great influence on the value of k. Obviously, however, the precise importance of the respective factors here in question can only be determined by experiments.

If we now compare the values for k here given with those from the North Sea as recorded in the literature (Heincke 1908, p. 123, A. C. Johansen 1910, p. 58, Borley 1912, p. 83 f.) it will at once be seen that the values for the Icelandic waters are on the whole much higher, despite the fact that the samples were taken at a time presumably about midway through the period of growth, so that k would doubtless rise still further in the course of the autumn. It will be seen from the tables that the value for k in Icelandic waters nearly always lies between 1.15 and 1.35, whereas the value for the

North Sea, according to the literature, lies more especially between 0.90 and 1.20, with highest figures in autumn. From this it would seem that the Icelandic plaice are on the whole in a better condition of nourishment than those of the North Sea. The *k*-values found, however, do not afford any definitive proof of this, as various objections may be raised against the direct comparison of the *k*-values here given with those noted in other works. In the first place it may be argued that the material should be dealt with according to precisely identical methods, e.g. that the plaice should have been out of the water for the same length of time before being weighed; and this is evidently not always the case with the material referred to in the literature. The degree of maturity also is a difficulty here, as maturity is attained at different lengths in different waters. Then again, we do not know anything as to whether any racial difference is expressed in the proportions of plaice from Iceland as compared with those from more southerly areas; and any values arrived at by means of the formula here employed can of course only be regarded as comparable in the case of stereometrically uniform bodies. It should here be noted that the plaice of the northerly North Sea are shorter and broader than those from the southerly North Sea (Kyle 1900, p. 229), and it is very probable that Icelandic plaice in the proportions as in other characters are nearest to the northerly North Sea plaice. Finally, we know nothing as to the relation between the specific weights of plaice from the different areas; and this value need not be constant for different races in different waters, though it can hardly be supposed to be of any influence in the case here considered.

Summary.

Plaice fishery in Icelandic waters exhibits similar features to those of this fishery in the North Sea; the catch per 100 hours trawling is, however, much beyond that of the North Sea, and most probably heavy overfishing will bring about a pronounced decline in the annual yield, as the rate of growth of plaice in many Icelandic localities is on the whole somewhat inferior to that of the North Sea fish.

The Icelandic plaice exhibits in some numerical characters investigated a difference from other known forms, e.g. in the higher total number of vertebræ. It should be noted, however, that great variations are found in the Icelandic area itself, evidently purely phænotypical, caused by the extreme hydrographical conditions met with in these waters. These facts as to the variation within the stock of plaice in Icelandic waters may serve to elucidate the conditions elsewhere in regard to racial studies in this species.

Plaice spawn in Icelandic waters especially on the western part of the South Coast and on the West Coast in February to May, with maximum in March—April; there is, however, also a little spawning, probably chiefly in May and June, on the East, and presumably also on the North Coast. From the important centres for propagation in South and West the plaice fry are distributed by the predominant currents (e.g. the Irminger Current) and migrations along the extensive Icelandic coasts.

The late spawning period in Icelandic waters has a very great influence on the rate of growth along most of the coasts, owing to the curtailment of the first period of growth.

Investigations have shown that the bottom stages of the 0-group first appear in Icelandic waters about the July 1st.

The small bottom stages are first met with in South-west Iceland (about July 1st), a little later in North-west Iceland (for about the first ten days of July), then in North Iceland (in the latter half of July) and latest in East Iceland (presumably end August and early September). In South Iceland there is a lack of observations, but the appearance of the youngest bottom stages will probably be about the end of June. In more southerly waters these stages appear close inshore from 1 to 2 months earlier than on the South-west Coast of Iceland and about 3—4 months earlier than on the East Coast. The appearance of the small bottom stages on the different coasts of Iceland agrees, in the main, with the movement of the anticyclonic current, and with the rise of temperature round the coasts in summer. It is, however, not yet clear whether the East Coast gets most of its supply via the North Coast or a part of it via the South-east Coast.

Up to the present, the most numerous finds of the bottom stages of the 0-group have been made on the North-west and North Coast.

The rate of growth during the first year is rather poor on the West, North and East Coast of Iceland, owing to the short first period which the small plaice have for growth and to the low temperatures prevailing during several months of the year in great parts of the area. Some of the I-group fish are therefore, in early summer, and even as late as in August, considerably smaller than in more southerly waters; in August we may find specimens of the I-group no more than 3—4 cm. long. On the western part of the South Coast the rate of growth is good during the first year, in accordance with the relative high temperatures prevailing here throughout the year, and also in accordance with the fact that the 0-group plaice take to bottom here earlier than on the other coasts of Iceland.

Trawling experiments in Icelandic waters during the years 1924—27, mainly inside the territorial limit, at depths between about 10 and 50 metres on the South, West, North and East Coasts have shown, that the age-composition of the stock of plaice is marked by a greater prominence of the younger year-classes at the mentioned depths in South Iceland than in West and North Iceland, and that in these years, East Iceland resembled mostly South Iceland in this respect.

It has been shown that a year-class need not be prominent on all the coasts of Iceland, probably owing to difference in the supply of pelagic fry carried by the current round the coasts.

The investigations have shown that in this, the most north-westerly part of the area of distribution of the species, enormous fluctuations may be met with in the strength of the age-groups; on the South Coast a single age-group has even amounted to about 97 per cent. of a trawl catch.

In the years 1924—27 the following composition of the year-classes has been

found: the 1922 year-class was greatly predominant, especially in South, West and East Iceland; the 1920 year-class was good in West, North and East Iceland; the 1921 year-class better than the poor 1923 year-class; and probably the 1924 year-class is very good. The order of precedence of these year-classes is in fairly close agreement with that noted in certain other parts of the area of distribution (North Sea) during the same years. Year-classes older than the 1920 year-class are not sufficiently known.

The maximal growth in Icelandic waters (probably for plaice everywhere), is found on the western part of the South Coast (near Portland); on the other hand, growth is slow in many other parts of the area. We find a very marked decline in the growth along the South Coast of Iceland round to the East Coast (amounting to about 10—11 cm. in separate age-groups), and this coincides with the fall in temperature there observed. Temperature and length of summer are thus of very great importance for the rate of growth in plaice, and probably the importance of these factors have been underestimated for the rate of growth in plaice generally.

The growth in Faxe Bay on the West Coast and in Skjálfandi Bay on the North Coast is inferior to that on the western part of the South Coast, but higher than that on the East Coast; the two localities in question are otherwise hardly properly representative of the growth on the West and North Coasts respectively, as local conditions appear to be of great importance here.

The Length-weight coefficient (k) is in July—August everywhere high in Icelandic waters; the k-values for the Icelandic waters are on the whole much higher than those from the North Sea. Icelandic plaice are thus probably in a better condition of nourishment than those of the North Sea, but various objections may be raised against the direct comparison of the k-values here given with those given in other works. In some parts of the Icelandic waters, the density of population etc. exerts considerable influence on the value of k.

APPENDIX

Tables I—XXXIV

Table I. **0-Gro**

Locality and date	Seydisfjord Sept. 20th, 1903	Húsavík Sept. 26th—Oct. 1st, 1903	Akranes June 30th—July 1st, 1904	Havnefjord July 5th—7th, 1904	Húsavík July 21st, 1904	Siglufjord August 15th, 1904	Hornvík August 24th, 1904	Ønundarfjord August 25th, 1904	Patreksfjord August 26th, 1904	Havnefjord August 29th,
Length in mm.										
55	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..
50	..	(1)	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	1
44	..	..	..	..	..	2	..	..	..	4
43	..	..	..	..	..	1	..	..	..	2
42	..	..	..	..	..	1	..	..	..	3
41	..	..	..	..	..	6	..	..	..	2
40	..	(7)	..	..	..	2	..	..	..	6
39	..	..	..	..	..	7	..	..	..	5
38	..	..	..	..	..	13	..	..	..	1
37	..	..	..	..	..	17	..	2	1	2
36	..	..	..	..	..	26	1	..	..	..
35	..	..	..	..	..	20	1	1	1	1
34	..	..	..	..	..	15	..	2	1	..
33	..	..	..	..	..	19	1	4	..	1
32	..	..	..	..	..	28	1	7	4	2
31	..	..	..	..	..	17	2	7	5	1
30	..	(10)	..	..	..	20	1	9	7	..
29	..	..	..	..	..	20	2	7	9	..
28	..	..	1	..	..	14	..	9	8	..
27	..	..	..	..	..	19	1	7	9	..
26	..	..	..	2	..	21	..	7	9	..
25	(4)	..	1	3	..	22	..	3	10	..
24	..	..	..	8	..	12	1	2	6	..
23	..	..	4	7	..	15	3	2	4	..
22	..	..	2	7	1	8	1	..	3	..
21	..	..	4	13	..	7	..	..	2	..
20	(8)	(2)	2	11	1	6	..	..	2	..
19	..	..	1	18	14	3	..	..	..	..
18	..	..	6	12	42	3	..	..	..	..
17	..	..	9	9	91	1	..	..	..	..
16	..	..	8	4	104	..	..	..	..	..
15	..	..	4	3	73	..	..	..	..	..
14	..	..	1	1	8	..	..	..	..	..
13	..	..	..	..	1	..	..	..	..	..
12	..	..	..	..	1	..	..	..	..	..
11	..	..	1	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..
5	..	..	..	..	..	..	..	..	..	..
Number	12	20	44	98	336	345	15	69	81	32
Average length (mm.)	ca. 22	ca. 33	18.32	20.01	16.39	30.37	28.53	29.20	27.10	39.7

net.

1924	Ønundarfjord July 17th—18th, 1924	Akranes August 8th, 1925	Skagastrand July 12th, 1926	Haganesvík July 20th, 1926	Siglufjord July 21st, 1926	Hrísey July 24th, 1926	Reykjarfjord July 25th—26th, 1926	Siglufjord July 29th, 1926	Húsavík July 31st, 1926	Dýrafjord August 7th, 1927	Hrísey August 12th, 1927	Húsavík August 16th, 1927	
	..	..	..	..	..	..	..	..	..	..	..	..	
	..	..	..	..	..	..	..	..	..	..	..	3	
	..	..	..	..	..	..	..	..	..	..	..	..	
	..	..	..	..	..	..	..	..	..	..	..	..	
	..	..	..	..	..	..	..	..	..	..	..	1	
	..	..	..	..	..	..	..	..	..	..	..	2	50
	..	..	..	..	..	..	..	..	..	..	1	2	
	..	..	..	..	..	..	..	..	..	..	..	2	
	..	..	..	..	..	..	..	..	..	..	1	2	
	..	..	..	..	..	..	..	..	..	..	..	5	
	..	..	..	..	..	..	..	..	..	..	..	..	
	..	..	..	..	..	..	..	..	..	..	2	4	
	..	..	..	..	..	..	..	..	..	2	1	16	
	..	..	..	..	..	..	..	..	..	..	..	9	
	..	..	..	..	..	..	..	..	..	..	..	15	
	..	..	..	..	..	..	..	..	..	1	1	10	40
	..	..	..	..	..	..	..	..	..	1	..	21	
	..	..	..	..	..	..	..	..	..	2	..	17	
	..	..	..	..	..	..	..	..	..	2	..	19	
	..	..	..	..	..	..	..	..	..	..	2	21	
	..	..	..	..	1	..	..	1	..	9	1	24	
	..	..	..	..	1	..	..	..	..	11	..	21	
	..	..	..	..	..	..	..	1	..	16	..	21	
	..	1	..	..	..	..	..	..	..	14	..	26	
	..	1	..	..	4	..	..	2	..	8	..	21	
	..	1	..	..	1	..	..	4	..	25	1	24	30
4	..	..	..	..	1	1	..	1	..	15	..	25	
5	..	..	..	..	6	..	..	4	1	12	1	29	
24	..	..	..	..	6	1	..	6	..	18	..	23	
31	..	..	..	..	4	..	..	4	..	15	..	22	
59	..	1	1	..	3	..	1	6	1	15	..	22	
71	..	1	..	..	10	1	..	4	..	8	1	13	
74	..	12	1	..	15	3	2	5	1	5	..	8	
59	..	13	2	..	16	2	6	4	..	4	..	5	
36	..	13	..	..	9	6	3	3	..	2	..	6	
27	..	20	..	..	12	8	6	6	..	3	..	1	20
32	..	17	..	..	7	9	12	1	..	..	..	4	
48	..	13	1	..	2	10	12	2	1	..	..	2	
64	..	14	..	..	..	13	16	..	..	..	..	..	
46	..	10	..	..	1	1	7	3	..	..	..	..	
43	..	16	..	..	..	1	15	1	.	..	..	..	
30	..	51	..	..	..	1	9	3	..	..	..	..	
15	..	44	..	..	..	..	2	..	..	..	..	..	
13	..	11	..	..	..	..	..	..	..	..	..	..	
8	..	..	..	..	..	..	..	..	..	..	..	..	
1	..	..	..	..	..	..	..	..	..	..	..	..	10
..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	...	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	
..	..	..	..	..	..	..	..	..	..	..	..	..	
690	3	236	5	99	57	91	61	4	188	12	446		
20.27	(31.00)	16.51	(22.00)	23.35	19.23	17.48	23.75	(23.50)	29.24	38.00	32.75		

Table II. **South Iceland.** Land

"Explorer" 1925. St. 40. June 27th—28th, 1925. *63°34′ N. 20°26′ W.*
Depth: 65 metres. Otter trawl: 2 hours.

Length in cms.	III[1]) 1922[1])			IV 1921			V 1920			VI 1919			VII 1918			VIII 1917			IX 1916			X+ 1915÷			indet.	
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	1
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
41	..	..	..	..	1	1	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	2	2	..	..	..	1	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..	2
39	..	..	..	..	6	6	1	..	1	1	1	2	..	..	..	..	1	1	..	..	..	..	..	..	..	..
38	..	..	..	1	4	5	1	..	1	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	1
37	..	..	..	..	..	..	1	..	1	1	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..	1
36	..	1	1	3	..	3	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35	2	1	3	2	2	4	1	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
34	3	4	7	..	1	1	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1
33	2	5	7	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
32	10	3	13	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
31	8	7	15	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
30	4	3	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	1	4	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
27	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No. ..	34	30	**64**	9	18	**27**	4	2	**6**	4	3	**7**	1	1	**2**	1	5	**6**	0	0	**0**	0	1	**1**	0	9
Av. l.[2])	31.26	31.47	**31.36**	35.89	37.06	**36.41**	37.25	34.50	**36.33**	37.50	36.00	**36.86**	43.00	41.00	**42.00**	38.00	41.20	**40.67**	..	..	..	..	48.00	**48.00**	..	..

[1]) Indicating the age-group and the year-class (year-brood) in tables II—XXXIII.
[2]) Not corrected by 0.5 in tables II—XXXIII.

II.

South Iceland. Eyjafjallasandr.

"Explorer" 1925. St. 43. June 30th, 1925. *63°25′ N. 19°25′ W.*
Depth: 45 metres. Otter trawl: 1 hour.

III 1922 ♂	III 1922 ♀♂	IV 1921 ♀	IV 1921 ♂	IV 1921 ♀♂	V 1920 ♀	V 1920 ♂	V 1920 ♀♂	VI 1919 ♀	VI 1919 ♂	VI 1919 ♀♂	VII 1918 ♀	VII 1918 ♂	VII 1918 ♀♂	VIII 1917 ♀	VIII 1917 ♂	VIII 1917 ♀♂	IX 1916 ♀	IX 1916 ♂	IX 1916 ♀♂	X+ 1915÷ ♀	X+ 1915÷ ♂	X+ 1915÷ ♀♂	indet. ♀	indet. ♂	Total ♀	Total ♂	Total ♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
..	..	..	1	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
2	4	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	2	5
2	8	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	6	5	11
1	3	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
4	9	..	1	1	..	..	..	..	1	1	..	..	..	..	..	..	1	..	1	..	..	..	1	..	7	6	13
7	14	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	9	16
15	29	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15	16	31
12	25	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14	12	26
14	25	..	1	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11	16	27
8	18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	8	18
10	23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13	10	23
9	19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	9	19
8	12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	8	12
5	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	5	9
6	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	6	7
1	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	4
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
105	**211**	4	10	**14**	1	2	**3**	2	1	**3**	0	0	**0**	0	0	**0**	1	0	**1**	0	0	**0**	2	2	116	120	**236**
30.45	**30.75**	39.75	36.00	**37.07**	33.00	37.50	**36.00**	35.50	35.00	**35.33**	..	..	..	..	..	..	35.00	..	**35.00**	..	..	..	..	..	31.61	31.17	**31.39**

Table IV. **South Iceland. Ing**

"Explorer" 1925. St. 47. July 1st, 1925. *63°50′ N. 16°33′ W.*
Depth: 24 metres. Otter trawl: 1 hour.

Length in cms.	III 1922			IV 1921			V 1920			VI 1919			VII 1918			VIII 1917			IX 1916			X+ 1915÷			indet.	
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
39	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
38	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
36	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
34	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
33	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
32	1	3	**4**	3	1	**4**	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
31	4	1	**5**	2	..	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	5	2	**7**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	11	6	**17**	1	1	**2**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	20	22	**42**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	27	26	**53**	2	2	**4**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	36	31	**67**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
25	42	59	**101**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24	46	41	**87**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
23	33	43	**76**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
22	33	34	**67**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	32	35	**67**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	11	18	**29**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
19	9	12	**21**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	5	10	**15**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	1	4	**5**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	1	3	**4**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
15	3	..	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No. ..	321	350	**671**	10	7	**17**	1	1	**2**	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	0	0	**0**	1	7
Av. l..	24.09	23.71	**23.89**	29.50	28.43	**29.06**	32.00	29.00	**30.50**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

South Iceland. Ingólfshöfdi.

"Explorer" 1925. St. 46. July 1st, 1925. *63°46′ N. 16°25′ W.*
Depth: 63 metres. Otter trawl: 1 hour.

III		IV			V			VI			VII			VIII			IX			X+			indet.		Total		
1922		1921			1920			1919			1918			1917			1916			1915÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	3	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3	2	5
1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2	3
5	6	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	6	7
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	19	2	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	3	11	16	27
29.50	29.32	34.00	29.50	31.75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	40.00	40.00	..	..	30.00	30.62	30.37

Table VI.

South Iceland. My

"Explorer" 1925. St. 48. July 2nd, 1925. *64°13' N. 15°28' W.*
Depth: 31 metres. Otter trawl: 1 hour.

Length in cms.	III 1922			IV 1921			V 1920			VI 1919			VII 1918			VIII 1917			IX 1916			X+ 1915÷			indet.		
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	.
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	2
47	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	.
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	1
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	1
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	1	..	..	1
43	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	..	1	..	..	..	..	1	1	..	..	1
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	1
41	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	.
40	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	.
39	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	.
38	..	..	..	..	1	1	..	..	..	..	1	1	..	..	..	..	..	..	..	1	1	..	..	..	..	..	1
37	..	..	..	..	1	1	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	.
36	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
35	..	..	..	..	..	..	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
34	..	..	..	..	1	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
33	..	..	..	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
32	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	2
31	..	..	..	4	7	11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
30	..	..	..	..	6	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
29	..	..	..	2	10	12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
28	..	..	..	4	5	9	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2
27	2	..	2	5	8	13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	6
26	1	2	3	19	9	28	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7
25	5	6	11	12	14	26	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	21
24	11	12	23	13	15	28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17
23	18	10	28	7	4	11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	20
22	30	41	71	3	7	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	24
21	30	46	76	2	3	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	33
20	22	36	58	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	34
19	23	24	47	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	24
18	10	18	28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28
17	3	7	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
16	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
15	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
14	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.
No.	157	204	**361**	74	94	**168**	3	4	**7**	2	1	**3**	1	4	**5**	1	1	**2**	2	2	**4**	1	6	**7**	11	3	25
Av. l.	21.09	20.77	**20.91**	25.54	26.55	**26.11**	29.33	28.75	**29.00**	34.50	38.00	**35.67**	37.00	42.75	**41.60**	43.00	39.00	**41.00**	47.50	35.50	**41.50**	49.00	44.50	**45.14**	..	..	23.27

I.

South Iceland. Lónsvík.

"Explorer" 1925. St. 49. July 2nd, 1925. *64°20′ N. 14°39′ W.*
Depth: 39 metres. Otter trawl: 1 hour.

III		IV			V			VI			VII			VIII			IX			X+			indet.		Total		
1922		1921			1920			1919			1918			1917			1916			1915÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	1	1	1	2
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	1	1	1	1	2	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	1	3	4
.	..	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
.	..	4	..	4	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	2	7
.	..	3	1	4	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	2	5
.	..	3	2	5	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	6	2	8
1	1	3	1	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	2	5
.	2	8	7	15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	8	18
2	5	6	7	13	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	12	10	22
4	8	6	8	14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	13	23
5	8	9	7	16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12	12	24
7	18	8	9	17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19	17	36
11	22	3	4	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14	16	30
17	34	5	5	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22	22	44
20	35	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17	21	38
16	25	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	16	26
9	18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9	9	18
7	11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	7	11
1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
01	190	63	54	117	5	4	9	0	0	0	0	0	0	0	1	1	1	0	1	0	0	0	3	6	161	166	327
	20.78	25.41	24.81	25.14	29.60	31.25	30.33	..	..	..	..	..	..	..	33.00	33.00	37.00	..	37.00	..	..	..	..	..	23.23	22.49	22.86

Table VIII.

South Iceland. Lan

"Dana" 1927. St. 3156. July 30th, 1927. *63°34′ N. 20°26′ W.*
Depth: 25—43 metres. Otter trawl: 4 hours.

Length in cms.	III 1924			IV 1923			V 1922			VI 1921			VII 1920			VIII 1919			IX 1918			X+ 1917÷			indet.	
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	2	1	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	1	**1**	..	1	**1**	..	..	..	..	1	**1**	..	..	..	..	..	..	..	1
40	..	..	..	..	..	..	4	5	**9**	..	..	..	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	4	6	**10**	..	1	**1**	1	1	**2**	..	1	**1**	..	1	**1**	..	..	..	..	..
38	..	..	..	..	..	..	2	10	**12**	2	3	**5**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	3	7	**10**	1	1	**2**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..
36	..	..	..	1	2	**3**	5	11	**16**	2	..	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35	..	1	**1**	4	1	**5**	4	8	**12**	..	..	..	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..
34	..	1	**1**	1	3	**4**	4	6	**10**	2	1	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
33	..	..	..	1	3	**4**	1	2	**3**	..	2	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
32	..	1	**1**	2	2	**4**	3	2	**5**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
31	3	2	**5**	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	1	5	**6**	1	..	**1**	1	1	**2**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	1	6	**7**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	1	2	**3**	1	1	**2**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	2	4	**6**	..	2	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	1	2	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
24	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No.	10	25	**35**	11	15	**26**	34	62	**96**	7	10	**17**	3	3	**6**	0	3	**3**	0	1	**1**	0	0	**0**	2	3
Av. l.	28.50	29.08	**28.91**	33.18	32.20	**32.62**	36.77	36.39	**36.52**	36.14	36.10	**36.12**	37.00	37.00	**37.00**	..	40.00	**40.00**	..	39.00	**39.00**	..	..	..	..	..

X.

South Iceland. Portland.

"Dana" 1927. St. 3066. July 6th, 1927. *63°25′ N. 19°20′ W.*
Depth: 20—48 metres. Otter trawl: 4 hours.

III		IV			V			VI			VII			VIII			IX			X			indet.		Total		
1924		1923			1922			1921			1920			1919			1918			1917÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	1	1	2
..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	1	1	2	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	1	2	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	2	2	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
..	..	..	..	..	2	1	3	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	2	2	4
..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
..	..	..	..	..	2	2	4	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	3	5
..	..	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
..	..	1	1	2	..	3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	4	5
..	..	..	1	1	..	3	3	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	1	1	5	6
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	1	2	1	3	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	3	5
..	..	..	1	1	1	1	2	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
1	2	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	3
1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	1	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	1	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	3
..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	6	4	8	12	17	18	35	1	2	3	2	2	4	0	0	0	0	0	0	3	1	4	0	1	31	34	65
32.50	29.33	35.00	33.50	34.00	40.29	39.17	39.71	34.00	37.50	36.33	43.00	45.00	44.00	..	..	..	..	..	..	51.33	50.00	51.00	..	..	39.03	37.94	38.46

Table X. **South Iceland.** Medalla

"Dana" 1927. St. 3069. July 7th, 1927. *63°40′ N. 17°43′ W.*
Depth: 20—60 metres. Otter trawl: $4^1/_2$ hours.

Length in cms.	II 1925 ♀	II 1925 ♂	II 1925 ♀♂	III 1924 ♀	III 1924 ♂	III 1924 ♀♂	IV 1923 ♀	IV 1923 ♂	IV 1923 ♀♂	V 1922 ♀	V 1922 ♂	V 1922 ♀♂	VI 1921 ♀	VI 1921 ♂	VI 1921 ♀♂	VII 1920 ♀	VII 1920 ♂	VII 1920 ♀♂	VIII 1919 ♀	VIII 1919 ♂	VIII 1919 ♀♂	IX 1918 ♀	IX 1918 ♂	IX 1918 ♀♂	indet. ♀	indet. ♂
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	2	1	**3**	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	2	1	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	3	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	1
39	..	..	..	..	..	..	..	..	..	6	2	**8**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
38	..	..	..	..	..	..	..	..	..	6	6	**12**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	..	7	11	**18**	2	..	**2**	1	..	**1**	..	..	..	..	..	..	..	1
36	..	..	..	..	..	..	..	..	..	11	7	**18**	1	1	**2**	..	..	..	..	..	..	..	..	..	1	..
35	..	..	..	..	..	..	1	..	**1**	18	11	**29**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
34	..	..	..	..	..	..	..	..	..	9	9	**18**	1	2	**3**	..	..	..	..	..	..	..	..	..	..	2
33	..	..	..	..	..	..	..	1	**1**	11	16	**27**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
32	..	..	..	..	..	..	1	1	**2**	11	11	**22**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..
31	..	..	..	2	1	**3**	..	..	..	5	8	**13**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	..	..	..	..	2	**2**	..	2	**2**	6	7	**13**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..
29	..	..	..	1	..	**1**	1	1	**2**	5	6	**11**	..	..	..	..	..	..	..	..	..	..	..	..	1	..
28	..	..	..	2	1	**3**	..	2	**2**	1	2	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	..	..	..	1	1	**2**	..	..	..	4	3	**7**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	..	..	..	6	7	**13**	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	..	..	..	8	3	**11**	..	..	..	3	2	**5**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24	..	..	..	5	6	**11**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	3	5	**8**	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	8	6	**14**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	..	..	..	6	2	**8**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	..	7	6	**13**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	..	..	..	4	1	**5**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	1	..	**1**	1	2	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	2	2	**4**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	2	1	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No. ..	1	0	**1**	58	47	**105**	4	9	**13**	111	106	**217**	5	6	**11**	1	1	**2**	0	0	**0**	0	0	**0**	2	4
Av. l..	18.00	..	**18.00**	22.74	22.89	**22.81**	29.50	28.11	**28.54**	33.91	33.58	**33.75**	35.20	34.00	**34.55**	37.00	43.00	**40.00**	..	..	..	..	..	..	..	..

South Iceland. Ingólfshöfdi.

"Dana" 1927. St. 3071. July 8th—9th, 1927. *63°50′ N. 16°33′ W.*
Depth: 15—30 metres. Otter trawl: 9 hours[1]).

II	IV			V			VI			VII			VIII			IX			X+			indet.		Total		
24	1923			1922			1921			1920			1919			1918			1917÷							
♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	1	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	..	..	3	3	6	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	3	7
..	..	..	..	5	3	8	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	1	5	5	10
..	1	..	1	9	9	18	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	10	20
..	..	1	1	9	7	16	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	1	11	9	20
..	..	1	1	13	13	26	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	1	1	15	17	32
1	2	2	4	26	16	42	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	30	20	50
..	2	5	7	19	23	42	..	1	1	..	1	1	..	..	..	..	..	..	..	..	..	1	2	22	32	54
1	1	1	2	15	14	29	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17	17	34
3	..	3	3	14	23	37	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	1	..	18	28	46
5	..	1	1	7	10	17	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	7	18	25
4	2	..	2	14	8	22	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20	10	30
3	1	1	2	6	13	19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	10	17	27
5	1	2	3	4	2	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	6	10	16
3	..	..	..	2	2	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	3	7
3	1	3	4	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	6	8
4	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	4	5
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	5	6
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	13	20	**33**	147	149	**296**	8	9	**17**	2	2	**4**	0	0	**0**	0	0	**0**	0	0	**0**	5	11	189	220	**409**[1])
25.40	28.61	29.80	**29.33**	31.87	31.52	**31.69**	32.87	32.89	**32.88**	38.00	34.50	**36.25**	..	..	..	..	..	..	..	..	..	..	..	31.31	30.56	**30.91**

ch 921 specimens (Average length 30.89 cm.).

Table XII. **South Icelan**

"Dana" 1927. St. 3075. July 9th, 1927. *64°20′ N. 14°39′ W.*
Depth: 36—43 metres. Otter trawl: 3 hours.

Length in cms.	III 1924			IV 1923			V 1922			VI 1921			VII 1920			VIII 1919			IX 1918			X+ 1917÷			indet.	
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
38	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
36	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
34	..	..	..	..	..	..	1	1	2	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
33	..	..	..	..	1	1	..	3	3	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
32	..	..	..	..	..	..	3	3	6	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
31	..	..	..	..	..	..	..	7	7	..	3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	..	..	..	..	..	..	5	6	11	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	..	..	..	..	..	..	6	12	18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	..	..	..	..	..	..	6	2	8	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	..	..	..	..	..	..	2	9	11	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	..	..	..	1	..	1	2	5	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	..	..	..	..	..	..	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No.	0	0	**0**	1	1	**2**	26	52	**78**	2	11	**13**	1	1	**2**	1	1	**2**	0	0	**0**	4	1	**5**	0	0
Av l.	..	..	..	26.00	33.00	**29.50**	28.96	28.87	**28.90**	31.50	30.73	**30.85**	40.00	41.00	**40.50**	46.00	42.00	**44.00**	..	..	..	52.25	49.00	**51.60**	..	..

East Iceland. Hjeradsflói.

"Dana" 1924. St. 2219. July 28th, 1924. *65°39′ N. 14°08′ W.*
Depth: 14—45 metres. Otter trawl: 1 hour.

II 1922 ♂	II 1922 ♀♂	III 1921 ♀	III 1921 ♂	III 1921 ♀♂	IV 1920 ♀	IV 1920 ♂	IV 1920 ♀♂	V 1919 ♀	V 1919 ♂	V 1919 ♀♂	VI 1918 ♀	VI 1918 ♂	VI 1918 ♀♂	VII 1917 ♀	VII 1917 ♂	VII 1917 ♀♂	VIII 1916 ♀	VIII 1916 ♂	VIII 1916 ♀♂	IX 1915 ♀	IX 1915 ♂	IX 1915 ♀♂	indet. ♀	indet. ♂	Total ♀	Total ♂	Total ♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	1	..	2	..	2
..	..	..	..	..	..	..	..	..	1	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	2	2
..	..	..	..	..	..	..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	1	1	2	3
..	..	..	..	..	..	1	1	2	1	3	3	..	3	..	..	..	..	..	..	..	..	..	1	1	6	3	9
..	..	..	..	..	..	2	2	..	3	3	1	2	3	..	..	..	..	..	..	..	..	..	..	..	1	7	8
..	..	..	..	..	1	..	1	..	1	1	1	1	2	..	..	..	..	..	..	..	..	..	4	1	6	3	9
..	..	..	..	..	1	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..	3	..	3
..	..	..	..	..	3	2	5	1	3	4	1	..	1	..	..	..	..	..	..	..	..	..	1	..	6	5	11
..	..	..	..	..	..	2	2	..	1	1	..	1	1	..	..	..	..	..	..	..	..	..	1	1	1	5	6
..	..	..	..	..	2	3	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	3	5
..	..	..	..	..	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	2
..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
..	..	1	..	1	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	4
..	..	1	4	5	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	6	7
..	..	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
..	..	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	..	4	4	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	6
1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
[illegible]	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	**5**	4	12	**16**	13	17	**30**	3	10	**13**	8	6	**14**	2	0	**2**	0	0	**0**	0	0	**0**	10	4	41	53	**94**
	14.00	20.00	19.67	**19.75**	25.23	25.35	**25.30**	30.67	30.00	**30.15**	30.87	31.00	**30.93**	36.50	..	**36.50**	..	..	..	..	..	..	..	..	27.56	25.09	**26.17**

Table XIV.

East Iceland.

"Dana" 1927. St. 3089. July 13th, 1927. *65°40′ N. 14°10′ W.*
Depth: 30—40 metres. Otter trawl: 5 hours[1]).

Length in cms.	III 1924 ♀	III 1924 ♂	III 1924 ♀♂	IV 1923 ♀	IV 1923 ♂	IV 1923 ♀♂	V 1922 ♀	V 1922 ♂	V 1922 ♀♂	VI 1921 ♀	VI 1921 ♂	VI 1921 ♀♂	VII 1920 ♀	VII 1920 ♂	VII 1920 ♀♂	VIII 1919 ♀	VIII 1919 ♂	VIII 1919 ♀♂	IX 1918 ♀	IX 1918 ♂	IX 1918 ♀♂	X+ 1917÷ ♀	X+ 1917÷ ♂	X+ 1917÷ ♀♂	indet. ♀	indet. ♂
55....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
41....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
40....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
39....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
38....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37....	..	..	..	..	..	..	..	..	..	..	2	**2**	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..
36....	..	..	..	..	..	..	..	..	..	..	1	**1**	3	..	**3**	..	..	..	..	..	..	..	..	..	1	..
35....	..	..	..	..	..	..	..	4	**4**	3	3	**6**	2	1	**3**	..	..	..	..	..	..	..	..	..	..	..
34....	..	..	..	..	..	..	7	1	**8**	3	1	**4**	..	..	..	..	..	..	..	..	..	..	..	..	2	..
33....	..	..	..	..	..	..	3	7	**10**	2	5	**7**	..	1	**1**	..	..	..	..	..	..	..	..	..	1	1
32....	..	..	..	..	1	**1**	11	11	**22**	4	6	**10**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
31....	..	..	..	..	..	..	14	16	**30**	2	3	**5**	..	..	..	..	..	..	..	..	..	..	..	..	2	1
30....	..	..	..	1	1	**2**	19	24	**43**	2	1	**3**	..	..	..	..	..	..	..	..	..	..	..	..	1	1
29....	..	..	..	1	..	**1**	17	30	**47**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	..	2	1
28....	..	..	..	..	..	..	15	13	**28**	2	2	**4**	..	..	..	..	..	..	..	..	..	..	..	..	2	3
27....	..	..	..	..	..	..	15	15	**30**	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	2
26....	1	..	**1**	..	1	**1**	13	9	**22**	3	2	**5**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25....	..	..	..	1	..	**1**	8	9	**17**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2
24....	..	..	..	1	..	**1**	3	7	**10**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
23....	..	..	..	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No. ..	1	0	**1**	4	3	**7**	125	147	**272**	23	27	**50**	5	2	**7**	0	1	**1**	0	0	**0**	0	0	**0**	12	12
Av. l..	26.00	..	**26.00**	27.00	29.33	**28.00**	28.97	28.99	**28.98**	31.00	32.07	**31.58**	35.60	34.00	**35.14**	..	37.00	**37.00**	..	..	..	..	..	..	..	..

[1]) Total catch 659 specimens (Average length 29.21 cm.).

V.

North Iceland. Skjálfandi Bay. Húsavík.

"Dana" 1924. St. 2206. July 26th, 1924. *66°02.5′ N. 17°22′ W.*

Depth: 6—0 metres. Eel hand seine.

I 1923 ♂	I 1923 ♀♂	II 1922 ♀	II 1922 ♂	II 1922 ♀♂	III 1921 ♀	III 1921 ♂	III 1921 ♀♂	IV 1920 ♀	IV 1920 ♂	IV 1920 ♀♂	V 1919 ♀	V 1919 ♂	V 1919 ♀♂	VI 1918 ♀	VI 1918 ♂	VI 1918 ♀♂	VII 1917 ♀	VII 1917 ♂	VII 1917 ♀♂	VIII+ 1916÷ ♀	VIII+ 1916÷ ♂	VIII+ 1916÷ ♀♂	indet. ♀	indet. ♂	Total ♀	Total ♂	Total ♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	2
..	..	..	..	..	..	..	..	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	2
..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	1	..	1	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	3
..	..	..	..	..	..	..	..	..	4	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
..	..	..	..	..	..	..	..	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
..	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
..	..	..	..	..	..	..	..	5	2	7	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	8
..	..	..	..	..	..	..	..	2	2	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
..	..	..	..	..	..	1	1	1	3	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
..	..	..	..	..	..	..	..	4	1	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
..	..	..	..	..	1	1	2	1	3	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	2	3	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
..	..	..	..	..	2	6	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8
..	..	..	..	..	8	6	14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14
..	..	..	..	..	5	7	12	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13
..	..	..	..	..	7	6	13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13
..	..	..	..	4	8	2	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14
..	..	..	..	13	3	2	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	18
..	..	..	..	22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22
..	..	..	..	27	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	29
..	..	..	..	27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	27
..	..	..	..	28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	28
..	..	..	..	15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
..	2	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
..	4	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
..	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
..	15	..	..	141	36	36	72	19	18	37	4	0	4	0	2	2	0	0	0	0	0	0	0	0	..	..	271
..	5.27	..	..	10.37	15.75	16.36	16.06	24.00	25.11	24.54	28.50	..	28.50	..	32.00	32.00	..	..	..	..	..	..	..	..	..	..	13.96

Table XVI.

North Iceland. Skjálfandi Bay.

"Dana" 1926. St. 2795. July 16th—17th, 1926. *66°02.5′ N. 17°22′ W.*

Depth: 5—0 metres. Eel hand seine.

Length in cms.	I 1925			II 1924			III 1923			IV 1922			V 1921			VI 1920			VII 1919			VIII+ 1918÷			indet.	
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
38	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
36	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
34	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
33	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
32	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..
31	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..
29	..	..	..	..	..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	..	..	..	..	..	..	1	..	1	2	2	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	..	..	..	..	..	..	..	..	..	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..
24	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	..	..	..	1	1	2	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	..	..	..	..	1	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	..	..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
20	..	..	..	..	..	..	1	3	4	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	..	..	..	..	..	..	2	2	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	..	3	2	2	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
16	..	..	..	..	..	7	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
15	..	..	..	..	..	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2
14	..	..	..	..	..	19	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	24	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	32	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..
10	..	..	..	..	..	44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	..	..	..	..	..	30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	..	..	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No.	..	..	21	..	..	198	10	14	24	6	6	12	1	2	3	0	0	0	0	0	0	0	0	0	2	5
Av. l.	..	..	5.67	..	..	11.59	18.60	19.50	19.12	24.50	25.17	24.83	25.00	31.00	29.00	..	..	..	..	..	..	..	..	..	..	..

II.

North Iceland. Skjálfandi Bay. Húsavík.

"Dana" 1927. St. 3267. August 16th, 1927. *66°02.5′ N. 17°22′ W.*

Depth: 5—0 metres. Eel hand seine.

I		II			III			IV			V			VI			VII			VIII+			indet.		Total		
926		1925			1924			1923			1922			1921			1920			1919÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	3	2	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
..	..	..	..	..	4	5	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9
..	..	..	..	..	6	13	19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19
..	..	..	..	..	10	13	23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	23
..	..	..	..	..	14	16	30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30
..	..	..	..	..	14	18	32	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	34
..	..	..	..	..	15	22	37	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	37
..	..	..	..	2	8	6	14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16
..	..	..	..	4	5	5	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	14
..	..	..	..	2	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
..	..	..	..	9	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10
..	..	..	..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
..	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	9	..	..	24	82	106	188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	..	..	223
	8.33	..	..	14.33	19.45	19.91	19.71	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	18.67

Table XVIII. **North Iceland.** Skjál

"Dana" 1924. St. 2209. July 26th—27th, 1924. *66°01′ N. 17°30′ W.*
Depth: 20—50 metres. Otter trawl: 9 hours[1]).

Length in cms.	III 1921			IV 1920			V 1919			VI 1918			VII 1917			VIII 1916			IX 1915			X+ 1914÷			indet.	
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
62	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
61	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
59	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
58	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
57	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	**3**	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	**3**	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	**3**	1	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	**3**	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	1	..	**1**	1	..	**1**	1	..
47	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	2	1	**3**	1	..	**1**	1	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	1	**1**	2	..	**2**	2	..	**2**	2	..	**2**	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	**2**	1	2	**3**	4	..	**4**	1	..
44	..	..	..	..	..	..	..	..	..	1	..	**1**	1	..	**1**	4	..	**4**	1	..	**1**	3	1	**4**	2	1
43	..	..	..	..	..	..	..	..	..	1	..	**1**	2	..	**2**	7	..	**7**	2	1	**3**	..	..	..	2	2
42	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	15	2	**17**	1	1	**2**	..	..	..	2	1
41	..	..	..	..	..	..	..	..	..	3	..	**3**	5	..	**5**	8	2	**10**	3	..	**3**	1	..	**1**	..	1
40	..	..	..	..	..	..	..	..	..	2	..	**2**	8	3	**11**	6	3	**9**	..	..	..	..	..	..	..	3
39	..	..	..	..	..	..	..	..	..	8	2	**10**	2	3	**5**	2	..	**2**	..	2	**2**	..	..	..	1	2
38	..	..	..	..	..	..	..	..	..	7	2	**9**	5	2	**7**	2	..	**2**	..	..	..	..	..	..	1	2
37	..	..	..	..	..	..	..	..	..	7	2	**9**	2	5	**7**	1	2	**3**	..	..	..	..	..	..	1	..
36	..	..	..	..	..	..	3	1	**4**	6	4	**10**	1	2	**3**	1	..	**1**	..	..	..	..	..	..	..	1
35	..	..	..	..	..	..	..	..	..	4	6	**10**	..	..	..	..	..	..	..	..	..	..	..	..	1	..
34	..	..	..	..	1	**1**	..	..	..	5	7	**12**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
33	..	..	..	..	..	..	2	3	**5**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
32	..	..	..	..	1	**1**	1	..	**1**	1	2	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
31	..	..	..	..	..	..	..	1	**1**	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No.	0	0	**0**	0	2	**2**	6	5	**11**	50	26	**76**	27	16	**43**	51	9	**60**	13	7	**20**	26	1	**27**	14	13
Av. l.	..	..	..	..	33.00	**33.00**	34.33	33.20	**33.82**	37.08	35.27	**36.46**	39.81	38.50	**39.33**	41.80	40.00	**41.53**	44.15	42.86	**43.70**	48.35	44.00	**48.19**	..	..

[1]) Total catch: 506 specimens (Average length 40.20 cm.).

X.

North Iceland. Skjálfandi Bay.

"Dana" 1924. St. 2210. July 27th, 1924. *65°59.5′ N. 17°30′ W.*
Depth: 7—10 metres. Otter trawl: $^1/_3$ hour[1]).

III		IV			V			VI			VII			VIII			IX			X+			indet.		Total		
1921		1920			1919			1918			1917			1916			1915			1914÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	2	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	1	1	2	..	2	1	..	1	1	..	1	..	..	..	1	..	2	..	2
..	..	..	..	..	..	..	..	1	..	1	1	1	2	..	1	1	..	..	..	..	..	..	1	..	3	2	5
..	..	..	..	..	..	..	..	2	2	4	3	..	3	1	..	1	..	..	..	..	..	..	1	..	3	1	4
..	..	..	..	..	..	..	..	6	2	8	..	1	1	1	..	1	..	..	..	..	..	..	..	..	6	2	8
..	..	..	..	..	1	..	1	8	5	13	1	1	2	..	1	1	..	..	..	..	..	..	..	..	7	3	10
..	..	..	..	..	1	..	1	10	5	15	..	..	..	..	1	1	..	..	..	..	..	..	1	..	11	7	18
..	..	..	..	..	..	..	..	7	8	15	..	..	..	1	..	1	..	..	..	..	..	..	..	2	11	8	19
..	..	1	1	..	..	..	..	7	8	15	..	..	..	1	..	1	..	..	..	..	..	..	1	1	9	10	19
..	..	..	..	..	3	1	4	8	9	17	..	..	..	..	..	..	..	..	..	..	..	..	1	1	12	11	23
..	..	..	..	..	1	2	3	6	8	14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7	10	17
..	..	..	..	..	6	4	10	2	4	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	8	16
..	..	..	..	..	3	4	7	3	2	5	..	..	..	..	..	..	..	..	..	..	..	..	2	..	8	6	14
..	..	..	..	..	6	5	11	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	6	14
..	..	2	..	2	4	5	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	5	11
..	..	1	1	2	2	3	5	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	5	8
..	..	..	..	..	5	5	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	5	10
..	..	1	..	1	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	3	2	5
..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	1	1	2	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	3
..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
0		5	5	**10**	34	33	**67**	55	48	**103**	7	3	**10**	5	3	**8**	2	0	**2**	7	0	**7**	9	4	124	96	**220**[1])
..		27.20	26.40	**26.80**	30.32	29.30	**29.82**	35.16	34.54	**34.87**	39.43	38.33	**39.10**	39.40	38.00	**38.88**	43.00	..	**43.00**	54.00	..	**54.00**	..	..	35.15	32.57	**34.03**

ch 417 specimens (Average length 33.73 cm.).

Table XX. **North Iceland.** Skjál

"Dana" 1925. St. 2458. August 10th—11th, 1925. *66°01' N. 17°30' W.*
Depth: 19—34 metres. Otter trawl: 6 hours.

Length in cms.	III 1922			IV 1921			V 1920			VI 1919			VII 1918			VIII 1917			IX 1916			X+ 1915÷			indet.	
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
62	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..
61	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..
59	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
58	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..
57	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..
56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	**2**	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..	**4**	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	**2**	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	**2**	2	..	**2**	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	**2**	1	..	**1**	1	..	**1**	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	**1**	1	..	**1**	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	1	..	**1**	..	..	..	1	..	**1**	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	3	..	**3**	2	..	**2**	..	1	**1**	..	1	**1**	..	1
42	..	..	..	..	..	..	..	..	..	1	..	**1**	2	..	**2**	2	..	**2**	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	2	..	**2**	1	..	**1**	2	..	**2**	..	2	**2**	..	..
40	..	..	..	..	..	..	..	..	..	1	..	**1**	6	2	**8**	..	..	..	..	..	..	..	..	..	..	1
39	..	..	..	..	..	..	..	..	..	3	1	**4**	5	..	**5**	..	..	..	..	..	..	..	1	**1**	2	..
38	..	..	..	..	..	..	..	..	..	3	1	**4**	7	3	**10**	..	..	..	..	..	..	..	..	..	..	1
37	..	..	..	..	..	..	..	..	..	3	4	**7**	3	4	**7**	1	..	**1**	1	..	**1**	..	..	..	..	2
36	..	..	..	..	..	..	..	..	..	4	3	**7**	2	1	**3**	..	..	..	..	..	..	..	..	..	1	..
35	..	..	..	..	..	..	2	1	**3**	1	6	**7**	3	1	**4**	..	..	..	..	..	..	..	..	..	..	1
34	..	..	..	..	..	..	2	3	**5**	6	1	**7**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..
33	..	..	..	..	..	..	4	3	**7**	4	3	**7**	..	1	**1**	..	..	..	..	..	..	..	..	..	1	..
32	..	..	..	..	..	..	2	..	**2**	..	2	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	1
31	..	..	..	..	..	..	3	..	**3**	1	1	**2**	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..
30	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No.	0	0	**0**	0	2	**2**	14	7	**21**	27	22	**49**	36	13	**49**	9	0	**9**	6	2	**8**	18	4	**22**	4	7
Av. l.	..	..	..	..	27.00	**27.00**	32.64	33.71	**33.00**	35.93	35.05	**35.53**	39.06	36.92	**38.49**	42.67	..	**42.67**	43.50	44.00	**43.63**	51.33	41.00	**49.45**	..	..

XI.

North Iceland. Skjálfandi Bay.

"Dana" 1925. St. 2459. August 11th, 1925. *66°00′ N. 17°30′ W.*
Depth: 7—10 metres. Otter trawl: $^1/_2$ hour.

III 1922		IV 1921			V 1920			VI 1919			VII 1918			VIII 1917			IX 1916			X+ 1915÷			indet.		Total		
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	2	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	3	..	3	..	..	..	..	..	..	..	1	1	..	..	3	1	4
..	..	..	..	..	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
..	..	..	..	..	..	..	..	1	..	1	2	2	4	..	..	..	..	..	..	..	..	..	..	..	3	2	5
..	..	..	..	..	..	..	..	2	..	2	2	3	5	..	1	1	..	..	..	..	..	..	..	1	4	5	9
..	..	..	..	..	..	..	..	3	3	6	2	1	3	..	..	..	..	..	..	..	..	..	..	1	5	5	10
..	..	..	..	..	1	..	1	6	5	11	1	1	2	..	..	..	..	..	..	..	..	..	1	..	9	6	15
..	..	..	..	..	1	3	4	7	9	16	5	2	7	..	..	..	..	..	..	..	..	..	2	..	15	14	29
..	..	..	..	..	10 1	8	19	5	6	11	2	1	3	..	..	..	..	..	..	..	..	..	..	..	17	15	33
..	..	..	..	..	14	7	21	7	9	16	1	1	2	..	..	..	..	..	..	..	..	..	..	1	22	18	40
..	..	1	..	1	8	12	20	4	4	8	1	..	1	..	..	..	..	..	..	..	..	..	1	..	15	16	31
..	..	..	1	1	16 1	11	28	4	1	5	1	..	1	..	..	..	..	..	..	..	..	..	1	..	22	13	36
..	..	1	..	1	9	2	11	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	12	2	14
..	..	1	..	1	.. 1	3	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3	5
..	..	..	..	..	2	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	2	2	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
0	0	3	4	7	64 3	48	115	42	37	79	20	11	31	0	1	1	0	0	0	3	1	4	6	3	138	105	246
..	..	29.33	25.75	27.29	30.92	30.98	30.93	33.17	33.22	33.19	35.30	35.55	35.39	..	37.00	37.00	..	..	..	55.67	40.00	51.75	..	..	32.80	32.30	32.56

Table XXII. **North Iceland.** Skjálf

"Dana" 1926. St. 2790. July 16th + St. 2910. July 27th, 1926. *66°01′ N. 17°30′ W.*
Depth: 20—38 metres. Otter trawl: 5 + 1 = 6 hours.

Length in cms.	III 1923			IV 1922			V 1921			VI 1920			VII 1919			VIII 1918			IX 1917			X+ 1916÷			indet.	
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
63	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
62	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
61	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
59	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
58	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
57	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	1	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	1	1	2	..	..
42	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	6	..	6	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	2	..	2	..	..	..	..	..	..	..	2
40	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	2	1	3	1	..	1	..	..	..	..	..
38	..	..	..	..	..	..	..	1	1	..	..	..	2	1	3	1	..	1	..	..	..	..	..	..	..	1
37	..	..	..	..	..	..	2	..	2	1	4	5	..	..	..	..	..	..	..	..	..	..	..	..	1	..
36	..	..	..	..	..	..	..	2	2	3	..	3	..	1	1	..	..	..	..	..	..	..	..	..	..	..
35	..	..	..	..	..	..	..	2	2	..	2	2	..	2	2	..	..	..	..	..	..	..	..	..	..	..
34	..	..	..	..	..	..	..	1	1	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..
33	..	..	..	..	..	..	1	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..
32	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
31	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No. ..	0	0	**0**	0	1	**1**	2	2	**4**	3	7	**10**	8	7	**15**	14	5	**19**	1	0	**1**	4	1	**5**	2	3
Av. l..	..	..	..	..	25.00	**25.00**	30.00	34.00	**32.00**	37.67	37.00	**37.20**	36.88	36.57	**36.73**	42.14	36.00	**40.53**	40.00	..	**40.00**	46.75	44.00	**46.20**	..	..

XIII. **North Iceland.** Skjálfandi Bay.

"Dana" 1926. St. 2793. July 16th + St. 2933. July 31st, 1926. *66°00′ W. 17°30′ W.*

Depth: 7—15 metres. Otter trawl: $2 \times {}^1/_2 = 1$ hour.

III		IV			V			VI			VII			VIII			IX			X+			indet.		Total		
1923		1922			1921			1920			1919			1918			1917			1916÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	1	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	2	..	2
..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	..	1	..	..	..	..	..	..	..	..	1	1	2
..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	2	..	2	2	..	2	1	..	1	..	..	..	..	..	..	..	..	5	..	5
..	..	..	..	..	..	1	1	4	..	4	..	2	2	..	..	..	..	..	..	..	..	..	..	..	4	3	7
..	..	..	..	..	1	1	2	4	5	9	..	..	..	..	..	..	..	..	..	..	..	..	1	..	6	6	12
..	..	..	..	..	1	..	1	..	4	4	2	1	3	..	..	..	..	..	..	..	..	..	..	..	3	5	8
..	..	1	..	1	..	..	..	6	2	8	..	1	1	..	..	..	..	..	..	..	..	..	..	..	7	3	10
..	..	..	..	..	2	..	2	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	1	4	1	5
..	..	1	3	4	2	1	3	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	4	8
..	..	2	..	2	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	3	3	6
..	..	1	2	3	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4
..	..	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
..	..	1	4	5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	4	5
..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
0	0	7	13	20	8	7	15	19	12	31	5	5	10	4	0	4	0	0	0	0	0	0	1	2	44	39	83
..	..	30.29	28.54	29.15	32.75	32.14	32.47	35.68	35.58	35.65	35.80	36.60	36.20	40.50	..	40.50	..	..	..	..	..	..	..	..	34.75	32.56	33.72

Table XXIV.

North Iceland. Skjálfa

"Dana" 1927. St. 3265. August 16th, 1927. *66°00.5′ N. 17°30′ W.*
Depth: 15—35 metres. Otter trawl: 6 hours.

Length in cms.	III 1924 ♀	III 1924 ♂	III 1924 ♀♂	IV 1923 ♀	IV 1923 ♂	IV 1923 ♀♂	V 1922 ♀	V 1922 ♂	V 1922 ♀♂	VI 1921 ♀	VI 1921 ♂	VI 1921 ♀♂	VII 1920 ♀	VII 1920 ♂	VII 1920 ♀♂	VIII 1919 ♀	VIII 1919 ♂	VIII 1919 ♀♂	IX 1918 ♀	IX 1918 ♂	IX 1918 ♀♂	X+ 1917÷ ♀	X+ 1917÷ ♂	X+ 1917÷ ♀♂	indet. ♀	indet. ♂
63....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
62....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
61....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
59....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
58....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
57....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
56....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..
48....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..
46....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..	1	..
45....	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..
44....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	2	..	2	..	..	..	..	..
42....	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2	..	..	..	..	..	..	..	..	..	..	..
41....	..	..	..	..	..	..	..	..	..	1	..	1	1	..	1	..	..	..	1	..	1	..	..	..	1	..
40....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	1	..	1	..	..
39....	..	..	..	..	..	..	..	..	..	1	2	3	..	2	2	..	..	..	..	..	..	..	1	1	..	..
38....	..	..	..	..	..	..	..	..	..	3	..	3	2	1	3	..	..	..	..	..	..	..	..	..	..	..
37....	..	..	..	..	..	..	1	..	1	2	3	5	2	2	4	..	1	1	..	..	..	..	..	..	..	..
36....	..	..	..	..	..	..	2	3	5	4	6	10	2	4	6	..	..	..	..	..	..	..	..	..	3	..
35....	..	..	..	..	..	..	4	7	11	2	6	8	2	..	2	..	..	..	..	..	..	..	..	..	2	1
34....	..	..	..	..	..	..	9	6	15	2	2	4	..	1	1	..	..	..	..	..	..	..	..	..	..	2
33....	..	..	..	1	1	2	3	5	8	2	3	5	..	..	..	..	..	..	..	..	..	..	..	..	1	2
32....	..	..	..	1	2	3	3	6	9	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	1
31....	..	..	..	2	1	3	3	3	6	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1
30....	..	..	..	1	4	5	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
29....	..	..	..	..	4	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
28....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27....	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
26....	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
25....	1	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No. ..	2	0	**2**	5	14	**19**	26	31	**57**	17	23	**40**	11	12	**23**	4	1	**5**	5	0	**5**	2	1	**3**	10	8
Av. l..	25.50	..	**25.50**	31.40	29.71	**30.16**	33.58	33.45	**33.51**	36.29	35.35	**35.75**	39.18	37.82	**38.48**	46.50	38.00	**44.80**	42.40	..	**42.40**	45.50	40.00	**43.67**	..	..

XV.

North Iceland. Skjálfandi Bay.

"Dana" 1927. St. 3266. August 16th, 1927. *66°00′ N. 17°30′ W.*
Depth: 9—20 metres. Otter trawl: $2 \times {}^1/_2 = 1$ hour.

3101. July 14th, 1927. *66°00′ N. 17°30′ W.* Depth: 9—20 metres. Otter trawl: $^1/_2$ hour.

III		IV			V			VI			VII			VIII			IX			X+			indet.		Total		
1924		1923			1922			1921			1920			1919			1918			1917÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	(1)	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	1	1	(1)	..	1	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	..	..	..	..	(1)[1]	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	(1)	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	1	..	1	(1)	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	(1)	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	2	1	1	2	1	1	2	2	1	3	1	1	2	0	0	0	0	0	0	1	0	1	0	0	6	6	12
26.50	26.50	30.00	28.00	29.00	34.00	37.00	35.50	32.50	38.00	34.33	38.00	36.00	37.00	..	..	..	..	..	..	51.00	..	51.00	..	..	36.33	32.00	34.17

St. 3101.

Table XXVI. **West Iceland.** Faxe Bay. Intrat

"Dana" 1924. St. 2142. June 25th—27th, 1924. *64°04′ N. 22°35′ W.*
Depth: 30—36 metres. Otter trawl: 17 hours.

Length in cms.	III 1921			IV 1920			V 1919			VI 1918			VII 1917			VIII 1916			IX 1915			X+ 1914÷			indet.		
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀
61	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1
60	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
59	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
58	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
57	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
56	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	2
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	1	..	..	1
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	1	..	..	..	..	..	2
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	1	..	1	..	..	..	..	..	2
49	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2	..	2	1	..	1	1	..	1	2	..	6
48	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	1	..	1	..	..	..	..	..	2
47	..	..	..	..	..	..	..	..	..	..	..	..	2	2	4	1	..	1	..	1	1	..	..	..	1	..	4
46	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2	..	..	..	2	1	3	..	..	..	1	..	4
45	..	..	..	..	..	..	..	..	..	..	..	..	5	..	5	2	..	2	3	..	3	..	..	..	2	1	12
44	..	..	..	..	..	..	..	..	..	..	..	..	3	1	4	2	2	4	2	..	2	..	..	..	..	1	7
43	..	..	..	..	..	..	..	..	..	1	..	1	2	1	3	..	..	..	1	..	1	..	1	1	..	1	4
42	..	..	..	..	..	..	..	..	..	3	..	3	9	2	11	1	3	4	..	2	2	..	..	..	2	1	15
41	..	..	..	..	..	..	..	..	..	3	5	8	4	7	11	2	1	3	2	2	4	..	..	..	5	2	16
40	..	..	..	..	..	..	..	..	..	5	3	8	13	12	25	4	1	5	..	2	2	1	..	1	7	1	30
39	..	..	..	..	..	..	1	1	2	8	7	15	18	16	34	4	3	7	..	..	..	..	..	..	1	6	32
38	..	..	..	..	..	..	7	3	10	4	14	18	21	19	40	7	4	11	5	..	5	..	..	..	3	5	47
37	..	..	..	..	..	..	2	7	9	17	14	31	19	35	54	4	2	6	..	2	2	..	..	..	2	6	44
36	..	..	..	..	..	..	11	..	11	23	29	52	27	19	46	4	2	6	..	4	4	..	..	..	12	10	77
35	..	..	..	2	..	2	15	21	36	15	16	31	26	44	70	..	..	..	..	3	3	..	..	..	10	2 8	68
34	..	..	..	..	3	3	21	31	52	6	33	39	38	21	59	..	5	5	..	..	..	..	..	..	9	1 18	74
33	..	..	..	10	6	16	26	21	47	22	32	54	14	29	43	..	3	3	..	..	..	..	..	..	15	9	87
32	..	..	..	19	32	51	21	31	52	21	14	35	19	32	51	..	..	..	..	..	..	..	..	..	11	14	91
31	..	..	..	19	18	37	8	16	24	5	25	30	21	16	37	3	..	3	..	..	..	..	..	..	8	7	64
30	..	2	2	20	32	52	18	19	37	5	7	12	7	13	20	..	..	..	..	..	..	..	..	..	9	1 7	59
29	..	2	2	13	21	34	7	29	36	10	14	24	7	17	24	..	..	..	..	..	..	..	..	..	3	10	40
28	..	3	3	18	23	41	7	18	25	5	11	16	5	11	16	..	..	..	..	..	..	..	..	..	2	1 4	37
27	1	1	2	15	16	31	12	13	25	10	11	21	6	6	12	..	..	..	..	..	..	..	..	..	2	3	46
26	3	1	4	19	18	37	6	6	12	1	6	7	1	7	8	..	..	..	..	..	..	..	..	..	2	3	32
25	..	2	2	6	17	23	8	5	13	2	5	7	1	1	2	..	..	..	..	..	..	..	..	..	2	2	19
24	4	1	5	6	6	12	4	10	14	2	3	5	2	7	9	..	..	..	..	..	..	..	..	..	..	..	18
23	1	..	1	7	20	27	6	3	9	3	..	3	..	1	1	..	..	..	..	..	..	..	..	..	2	2	19
22	..	1	1	..	7	7	5	4	9	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5
21	..	1	1	2	7	9	1	3	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
20	..	1	1	1	3	4	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	3
19	1	3	4	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
18	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No.	10	18	**28**	160	229	**389**	187	243	**430**	171	250	**421**	273	321	**594**	37	26	**63**	20	17	**37**	5	2	**7**	117	5 121	980
Av l.	24.30	24.94	**24.71**	28.43	27.88	**28.11**	30.99	30.57	**30.76**	33.56	33.00	**33.22**	35.37	34.06	**34.66**	39.62	37.65	**38.81**	44.10	38.94	**41.73**	51.80	48.00	**50.71**	..	..	33.32

XVII.

West Iceland. Faxe Bay. Extraterritorial.

24. St. 2129. June 11th—13th, 1924. *64°08′ N. 22°23′ W.* Depth: 33 metres. Otter trawl: 12 hours.
. June 21st—25th, 1924. *64°08′ N. 22°23′ W.* Depth: 34—37 metres. Otter trawl: 39 hours.

III		IV			V			VI			VII			VIII			IX			X+			indet.		Total		
921		1920			1919			1918			1917			1916			1915			1914÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	1	1	..	..	..	2	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	1	..	1	..	..	2	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	2	1	3	..	..	..	..	..	..	..	..	..	..	1	2	2	4
..	..	..	..	..	..	..	..	2	..	2	2	1	3	..	1	1	..	..	..	..	..	..	..	..	4	2	6
..	..	..	..	..	..	..	..	..	..	..	2	3	5	2	..	2	..	2	2	..	..	..	..	..	4	5	9
..	..	..	..	..	..	..	..	..	..	..	1	..	1	1	..	1	1	..	1	..	..	..	..	..	3	..	3
..	..	..	..	..	..	..	..	..	1	1	3	..	3	..	..	..	1	1	2	..	..	..	..	..	4	2	6
..	..	..	..	..	..	..	..	1	1	2	3	..	3	..	1	1	..	1	1	..	..	..	1	..	5	3	8
..	..	..	..	..	..	1	1	1	3	4	5	3	8	4	..	4	1	1	2	..	..	..	1	..	12	8	20
..	..	..	..	..	1	2	3	4	3	7	5	4	9	2	2	4	..	1	1	..	..	..	1	..	13	12	25
.	..	..	..	..	3	2	5	6	3	9	13	8	21	..	2	2	..	..	..	..	..	..	1	1	23	16	39
.	..	1	..	1	2	5	7	5	4	9	5	8	13	..	..	..	1	..	1	..	..	..	1	2	15	19	34
.	..	1	..	1	1	3	4	6	7	13	5	10	15	1	..	1	..	..	..	..	..	..	3	1	17	21	38
.	..	2	2	4	5	13	18	7	6	13	11	6	17	..	..	..	..	1	1	..	..	..	2	..	27	28	55
.	..	5	2	7	6	9	15	4	7	11	10	9	19	2	..	2	..	..	..	..	..	..	2	2	29	29	58
.	..	6	5	11	7	8	15	4	9	13	12	7	19	..	..	..	..	1	1	..	..	..	4	2	33	32	65
.	..	6	3	9	12	10	22	5	5	10	8	8	16	1	..	1	..	1	1	..	..	..	2	1	34	28	62
1	1	9	2	11	7	8	15	6	9	15	6	8	14	..	1	1	..	..	..	..	..	..	..	3	28	32	60
.	..	6	6	12	7	6	13	2	2	4	3	3	6	..	..	..	..	..	..	..	..	..	2	4	20	21	41
4	4	8	9	17	7	14	21	2	4	6	3	4	7	..	..	..	..	..	..	..	..	..	..	3	20	38	58
4	6	11	6	17	3	4	7	4	2	6	4	3	7	..	..	..	..	..	..	..	..	..	..	1	24	20	44
2	3	4	2	6	5	4	9	1	2	3	2	2	4	..	..	..	..	..	..	..	..	..	..	..	13	12	25
.	2	5	6	11	2	3	5	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	10	9	19
1	2	3	6	9	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	7	13
2	4	2	6	8	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	5	10	15
.	1	2	1	3	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	1	6
.	..	2	1	3	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	4
1	2	..	2	2	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	4	6
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	2
1	2	1	3	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	4	6
.	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	29	75	62	137	72	94	166	63	68	131	106	89	195	15	7	22	4	9	13	5	2	7	20	23	371	372	743
	26.24	30.20	28.71	29.53	32.22	33.01	32.67	35.05	34.88	34.96	36.36	35.88	36.14	41.00	39.71	40.59	41.50	39.89	40.38	53.20	53.00	53.14	.	.	34.21	33.45	33.81

Table XXVIII.

West Iceland. Faxe Bay. Intrat

"Dana" 1925. St. 2445. August 1st—6th, 1925. *64°04′ N. 22°35′ W.*
Depth: 34—37 metres. Otter trawl: 20 hours[1]).

Length in cms.	III 1922			IV 1921			V 1920			VI 1919			VII 1918			VIII 1917			IX 1916			X+ 1915÷			indet.		
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	1
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	..	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..
38	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
37	..	..	..	..	..	..	..	1	**1**	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..
36	..	..	..	..	..	..	1	..	**1**	..	1	**1**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	2
35	..	..	..	..	..	..	..	1	**1**	1	..	**1**	1	1	**2**	..	1	**1**	..	..	..	..	..	..	..	..	2
34	..	..	..	..	1	**1**	1	1	**2**	2	1	**3**	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	4
33	..	..	..	1	1	**2**	3	..	**3**	..	2	**2**	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	5
32	..	..	..	1	2	**3**	6	5	**11**	..	..	..	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	7
31	..	..	..	4	..	**4**	3	5	**8**	1	..	**1**	2	..	**2**	1	..	**1**	..	..	..	..	..	..	1	1	12
30	1	..	**1**	..	4	**4**	5	4	**10**	2	1	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	1	8
29	..	..	..	3	3	**6**	9	9	**18**	..	1	**1**	1	..	**1**	..	..	..	..	..	..	..	..	..	1	..	14
28	..	..	..	3	6	**9**	8	15	**23**	2	1	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	1	13
27	..	2	**2**	1	4	**5**	1	3	**4**	2	..	**2**	1	..	**1**	..	..	..	..	..	..	..	..	..	1	..	6
26	1	..	**1**	2	3	**5**	3	5	**8**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6
25	3	1	**4**	4	5	**9**	5	8	**13**	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13
24	3	2	**5**	2	3	**5**	2	3	**5**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	7
23	..	2	**2**	1	1	**2**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
22	1	..	**1**	3	4	**7**	..	2	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
21	1	3	**4**	..	1	**1**	..	1	**1**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
20	..	1	**1**	..	2	**2**	1	..	**1**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
19	..	1	**1**	3	1	**4**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3
18	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No. ..	10	14	**24**	28	41	**69**	50	64	**115**	11	9	**20**	7	4	**11**	3	3	**6**	0	0	**0**	0	0	**0**	3	5	112
Av. l. ..	24.60	22.00	**23.08**	26.18	26.34	**26.28**	28.96	28.02	**28.44**	29.91	29.33	**29.65**	31.86	37.25	**33.82**	38.00	35.33	**36.67**	..	..	..	..	..	..	..	..	28.39

[1]) Total catch: 3116 specimens.

XIX. **West Iceland.** Faxe Bay. Extraterritorial.

"Dana" 1925. St. 2443. July 30th—August 1st, 1925. *64°08′ N. 22°23′ W.*
Depth: 30—37 metres. Otter trawl: 15 hours.

46. August 7th, 1925. *64°08′ N. 22°23′ W.* Depth: 34—36 metres. Otter trawl: 4 hours.

III		IV			V			VI			VII			VIII			IX			X+			indet.		Total		
1922		1921			1920			1919			1918			1917			1916			1915 ÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	1	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	1	1	1	..	1	..	..	..	..	1	1	..	..	..	..	..	..	1	..	2	2	4
..	..	1	1	2	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
..	..	..	..	..	1	3	4	1	1	2	..	..	..	..	..	..	1	..	1	..	..	..	..	2	3	6	9
..	..	1	1	2	3	2	5	1	..	1	..	..	..	1	..	1	..	..	..	..	..	..	..	..	6	3	9
..	..	..	1	1	4	2	6	..	1	1	..	2	2	1	..	1	..	..	..	..	..	..	..	..	5	6	11
..	..	..	..	..	4	1	5	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	1	6
1	1	1	1	2	1	1	2	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	6	8
..	..	3	..	3	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	4
..	..	1	1	2	2	..	2	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	1	5
..	..	..	..	..	1	..	1	1	..	1	1	1	2	..	..	..	..	..	..	..	..	..	..	..	3	1	4
1	1	..	..	..	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	3
1	1	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	3
..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	6	7	6	13	18	14	32	10	4	14	2	5	7	2	2	4	1	0	1	0	0	0	1	3	42	39	81
27.00	26.50	32.43	31.83	32.15	32.44	34.00	33.12	35.90	33.50	35.21	36.50	36.00	36.14	34.50	42.50	38.50	36.00	..	36.00	..	..	..	..	..	33.57	33.46	33.52

Table XXX.

West Iceland. Faxe Bay. Intrat

"Dana" 1926. St. 2640. June 21st—24th, 1926. *64°04′ N. 22°35′ W.*
Depth: 34—37 metres. Otter trawl: 28 hours[1]).

Length in cms.	III 1923			IV 1922			V 1921			VI 1920			VII 1919			VIII 1918			IX 1917			X+ 1916÷			indet.	
	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
67....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	**1**	..	..
66....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
65....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
64....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
63....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
62....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..
61....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
59....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
58....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
57....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
56....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
51....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
49....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..
48....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
44....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
43....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..
42....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	1	1
41....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
40....	..	..	..	..	..	..	..	..	..	..	..	..	1	1	**2**	1	..	**1**	2	..	**2**	..	..	..	..	..
39....	..	..	..	..	..	..	..	..	..	3	1	**4**	1	..	**1**	1	..	**1**	1	1	**2**	..	..	..	..	2
38....	..	..	..	..	..	..	..	1	**1**	..	3	**3**	..	..	..	..	1	**1**	2	..	**2**	..	..	..	..	..
37....	..	..	..	..	..	..	1	..	**1**	2	1	**3**	..	..	..	..	..	..	1	..	**1**	..	..	..	2	1
36....	..	..	..	..	..	..	2	2	**4**	5	7	**12**	1	1	**2**	..	1	**1**	..	2	**2**	..	..	..	1	..
35....	..	..	..	..	..	..	..	3	**3**	3	6	**9**	2	..	**2**	..	2	**2**	..	..	..	..	..	..	2	..
34....	..	..	..	1	..	**1**	3	5	**8**	9	5	**14**	1	1	**2**	..	..	..	..	1	**1**	..	..	..	1	..
33....	..	..	..	..	2	**2**	3	3	**6**	11	12	**23**	3	4	**7**	..	..	..	1	1	**2**	..	..	..	1	1
32....	..	..	..	1	3	**4**	5	4	**9**	7	9	**16**	2	2	**4**	2	..	**2**	..	1	**1**	..	..	..	1	1
31....	..	..	..	1	1	**2**	5	6	**11**	4	12	**16**	..	3	**3**	..	..	..	..	..	..	..	..	..	3	1
30....	1	..	**1**	3	6	**9**	6	11	**17**	8	14	**22**	..	1	**1**	..	..	..	..	..	..	..	..	..	1	3
29....	2	..	**2**	4	3	**7**	2	8	**10**	7	7	**14**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	1
28....	..	..	..	3	3	**6**	1	4	**5**	6	12	**18**	..	..	..	..	1	**1**	..	..	..	..	..	..	1	..
27....	1	..	**1**	3	5	**8**	3	6	**9**	3	2	**5**	..	..	..	..	..	..	..	..	..	..	..	..	..	2
26....	..	..	..	2	3	**5**	1	3	**4**	..	2	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	1
25....	..	..	..	1	..	**1**	1	2	**3**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24....	..	..	..	2	1	**3**	2	3	**5**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23....	..	1	**1**	..	2	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22....	1	1	**2**	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21....	..	1	**1**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18....	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17....	..	..	..	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No. ..	5	3	8	22	31	**53**	35	62	**97**	69	95	**164**	11	14	**25**	6	5	**11**	8	6	**14**	1	1	**2**	14	14
Av. l..	27.40	22.00	**25.38**	27.95	27.94	**27.94**	30.60	29.85	**30.12**	32.03	31.49	**31.72**	34.73	32.71	**33.60**	39.50	34.40	**37.18**	38.50	35.00	**37.00**	63.00	67.00	**65.00**	..	..

[1]) Total catch: 990 specimens.

XXI. **West Iceland.** Faxe Bay. Extraterritorial.

"Dana" 1926. St. 2648. June 25th—27th, 1926. *64°08′ N. 22°23′ W.*
Depth: 34—40 metres. Otter trawl: 20 hours.
. 2659. June 27th, 1926. *64°08′ N. 22°23′ W.* Depth: 36 metres. Otter trawl: 6 hours.

III		IV			V			VI			VII			VIII			IX			X +			indet.		Total		
1923		1922			1921			1920			1919			1918			1917			1916 ÷							
♂	♀ ♂	♀	♂	♀ ♂	♀	♂	♀ ♂	♀	♂	♀ ♂	♀	♂	♀ ♂	♀	♂	♀ ♂	♀	♂	♀ ♂	♀	♂	♀ ♂	♀	♂	♀	♂	♀ ♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	2	..	2
..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	2
..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	2	2	..	1	1	..	..	..	..	..	..	1	..	1	..	..	..	..	..	1	3	4
..	..	..	..	..	..	..	..	2	4	6	..	1	1	..	..	..	..	..	..	..	..	..	..	..	2	5	7
..	..	..	..	..	1	1	2	..	2	2	..	1	1	..	1	1	..	..	..	..	..	..	..	..	1	5	6
..	..	2	..	2	..	2	2	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	2	5
..	..	..	..	..	..	3	3	1	5	6	..	1	1	..	..	..	..	..	..	..	..	..	..	..	1	9	10
..	..	..	..	..	1	1	2	1	1	2	..	2	2	..	..	..	..	..	..	..	..	..	..	..	2	4	6
..	..	..	1	1	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
1	1	1	2	3	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	4	5
..	..	1	1	2	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	1	4
..	..	..	2	2	..	2	2	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	6
..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	4	6	10	4	11	15	8	18	26	0	6	6	2	1	3	1	0	1	0	0	0	0	1	19	44	63
30.00	30.00	31.75	29.33	30.30	31.75	33.09	32.73	33.63	33.33	33.42	..	34.83	34.83	40.00	35.00	38.33	37.00	..	37.00	..	..	..	..	..	33.68	33.02	33.22

Table XXXII. **West Iceland.** Faxe Bay. Intra

"Dana" 1927. St. 3128. July 20th—August 2nd, 1927. *64°04′ N. 22°35′ W.*
Depth: 32—40 metres. Otter trawl: 30 hours[1]).

Length in cms.	II 1925		III 1924			IV 1923			V 1922			VI 1921			VII 1920			VIII 1919			IX 1918			X+ 1917÷			indet.	
	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂
55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
54	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	**1**	..	..
51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..
49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..
48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
47	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..
44	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..
43	..	..	..	..	..	..	..	..	..	..	..	..	2	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..
41	..	..	..	..	..	..	..	..	1	..	**1**	..	..	..	2	2	**4**	1	..	**1**	1	..	**1**	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	1	**1**	2	..	**2**	3	3	**6**	..	1	**1**	..	..	..	..	..	..	..	..
39	..	..	..	..	..	..	..	..	1	1	**2**	3	2	**5**	..	3	**3**	..	..	..	1	..	**1**	1	..	**1**	1	1
38	..	..	..	..	..	..	..	..	1	2	**3**	3	3	**6**	2	2	**4**	2	1	**3**	..	..	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	6	1	**7**	4	3	**7**	2	2	**4**	..	1	**1**	..	..	..	1	..	**1**	..	1
36	..	..	..	..	..	..	..	..	3	4	**7**	5	4	**9**	3	3	**6**	..	3	**3**	..	..	..	..	..	..	1	..
35	..	..	..	..	..	..	1	**1**	1	7	**8**	3	3	**6**	2	8	**10**	2	2	**4**	..	..	..	..	..	..	1	1
34	..	..	..	..	..	3	3	**6**	5	2	**7**	5	6	**11**	2	4	**6**	..	1	**1**	..	..	..	..	..	..	..	..
33	..	..	..	..	..	2	1	**3**	6	10	**16**	3	5	**8**	5	2	**7**	..	..	..	..	..	..	..	..	..	1	1
32	..	..	..	..	..	3	7	**10**	2	11	**13**	4	4	**8**	2	8	**10**	..	1	**1**	..	..	..	..	..	..	2	1
31	..	..	..	1	**1**	2	5	**7**	5	8	**13**	5	2	**7**	2	2	**4**	..	..	..	..	..	..	..	..	..	2	2
30	..	..	2	1	**3**	4	4	**8**	7	7	**14**	4	3	**7**	1	1	**2**	2	1	**3**	..	..	..	..	..	..	..	1
29	..	..	..	2	**2**	4	8	**12**	2	5	**7**	3	2	**5**	2	2	**4**	..	..	..	..	..	..	..	..	..	1	2
28	..	..	3	2	**5**	1	5	**6**	..	7	**7**	..	2	**2**	1	..	**1**	..	1	**1**	..	..	..	..	..	..	..	1
27	..	..	..	2	**2**	3	2	**5**	2	7	**9**	2	5	**7**	..	..	..	..	..	..	..	..	..	..	..	..	1	1
26	..	..	1	2	**3**	1	5	**6**	2	4	**6**	..	3	**3**	..	..	..	..	..	..	..	..	..	..	..	..	..	1
25	..	..	3	2	**5**	1	2	**3**	2	2	**4**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	1
24	..	..	1	..	**1**	2	2	**4**	..	2	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
23	..	..	..	2	**2**	..	1	**1**	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	..	..	1	..	**1**	1	1	**2**	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	..	..	..	2	**2**	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	..	..	2	..	**2**	2	2	**4**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	..	..	1	1	**2**	..	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	..	..	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	1	**1**	..	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	1	1	**2**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	..	..	..	..	..	1	..	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	1	**1**	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
No. ..	1	**1**	15	20	**35**	31	50	**81**	47	83	**130**	48	50	**98**	32	43	**75**	8	12	**20**	2	0	**2**	3	1	**4**	10	14
Av. l..	13.00	**13.00**	24.40	24.45	**24.43**	28.00	28.50	**28.31**	32.26	30.87	**31.37**	33.85	32.78	**33.31**	35.88	35.05	**35.40**	36.63	34.75	**35.50**	40.00	..	**40.00**	40.33	53.00	**43.50**	..	..

[1]) Total catch: 3676 specimens.

XXIII.

West Iceland. Faxe Bay. Extraterritorial.

"Dana" 1927. St. 3127. July 18th—27th, 1927. *64°08′ N. 22°23′ W.*

Depth: 35—49 metres. Otter trawl: 25 hours.

III		IV			V			VI			VII			VIII			IX			X+			indet.		Total		
924		1923			1922			1921			1920			1919			1918			1917÷							
♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀	♂	♀♂
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	1	1	2	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	3	1	4
..	..	..	..	..	1	..	1	1	1	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	1	3
..	..	..	..	..	..	2	2	..	..	..	1	..	1	..	..	..	..	1	1	..	..	..	..	..	1	3	4
..	..	..	..	..	3	..	3	1	2	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4	2	6
..	..	2	..	2	4	3	7	3	3	6	3	3	6	..	2	2	..	..	..	..	..	..	1	..	13	11	24
..	..	2	..	2	3	4	7	3	3	6	2	5	7	..	3	3	..	..	..	..	..	..	1	1	11	16	27
..	..	2	1	3	3	8	11	2	3	5	3	6	9	1	..	1	..	1	1	..	..	..	..	1	11	20	31
..	..	5	6	11	2	4	6	11	5	16	5	1	6	1	..	1	..	..	..	..	..	..	2	..	26	16	42
..	2	4	6	10	7	8	15	8	7	15	4	3	7	..	2	2	..	..	..	..	..	..	..	1	25	27	52
1	2	2	6	8	8	6	14	5	7	12	2	1	3	1	..	1	..	..	..	1	..	1	..	2	20	23	43
3	4	3	6	9	11	8	19	4	5	9	1	1	2	1	..	1	..	..	..	..	..	..	..	1	21	24	45
..	..	1	4	5	3	7	10	1	1	2	1	2	3	..	..	..	..	..	..	..	..	..	2	1	8	15	23
2	3	2	3	5	1	6	7	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	1	..	7	11	18
5	5	..	2	2	2	3	5	1	2	3	1	..	1	..	..	..	..	..	..	..	..	..	..	1	4	13	17
..	..	..	..	..	..	1	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	2
2	3	..	..	..	1	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	3	5
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	1	..	1	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	3
..	1	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	**22**	25	34	**59**	50	63	**113**	43	41	**84**	26	22	**48**	4	7	**11**	0	2	**2**	1	0	**1**	7	8	164	191	**355**
	29.05	33.40	32.71	**33.00**	34.06	33.33	**33.66**	34.30	34.51	**34.40**	35.96	35.41	**35.71**	34.00	36.43	**35.55**	..	38.00	**38.00**	33.00	..	**33.00**	..	..	34.05	33.57	**33.79**

Table XXXIV. Average Weight of

Length in cm.	Faxe Bay. Extraterritorial			Faxe Bay. Intraterritorial.			Landeyjasandr		
	♀	♂	♀+♂	♀	♂	♀+♂	♀	♂	♀+♂
57	.. ..	.. ..	.. ..	2310.0 (1)	.. ..	2310.0 (1)	.. ..	.. ..	.. ..
56	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
55	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
54	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
53	.. ..	.. ..	.. ..	.. ..	1660.0 (1)	1660.0 (1)	.. ..	.. ..	.. ..
52	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
51	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
50	.. ..	.. ..	.. ..	1600.0 (1)	.. ..	1600.0 (1)	.. ..	.. ..	.. ..
49	.. ..	.. ..	.. ..	1640.0 (1)	.. ..	1640.0 (1)	.. ..	.. ..	.. ..
48	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
47	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..
46	1335.0 (1)	.. ..	1335.0 (1)	1200.0 (1)	.. ..	1200.0 (1)	.. ..	.. ..	.. ..
45	.. ..	.. ..	.. ..	1167.5 (2)	.. ..	1167.5 (2)	.. ..	.. ..	.. ..
44	.. ..	.. ..	.. ..	1200.0 (1)	.. ..	1200.0 (1)	.. ..	.. ..	.. ..
43	.. ..	1005.0 (1)	1005.0 (1)	.. ..	925.0 (2)	925.0 (2)	942.5 (2)	850.0 (1)	911.7 (3)
42	911.7 (3)	805.0 (1)	885.0 (4)	.. ..	1035.0 (1)	1035.0 (1)	.. ..	915.0 (1)	915.0 (1)
41	850.0 (2)	1035.0 (1)	911.7 (3)	842.0 (5)	817.5 (2)	835.0 (7)	.. ..	788.3 (3)	788.3 (3)
40	760.0 (1)	748.3 (3)	751.3 (4)	752.0 (5)	755.0 (5)	753.5 (10)	807.5 (4)	750.0 (6)	773.0 (10)
39	777.5 (4)	732.5 (2)	762.5 (6)	716.4 (7)	680.7 (7)	698.6 (14)	743.0 (5)	716.5 (10)	725.3 (15)
38	698.1 (13)	681.4 (11)	690.4 (24)	660.0 (8)	658.1 (8)	659.1 (16)	701.3 (4)	683.1 (13)	687.4 (17)
37	637.0 (10)	621.9 (16)	627.7 (26)	608.9 (18)	601.9 (8)	606.7 (26)	603.0 (5)	641.1 (9)	627.5 (14)
36	581.5 (10)	573.0 (20)	575.8 (30)	550.8 (12)	560.0 (14)	555.8 (26)	583.1 (8)	556.2 (13)	566.4 (21)
35	537.3 (22)	538.7 (15)	537.8 (37)	507.8 (9)	503.4 (22)	504.7 (31)	531.7 (9)	554.1 (11)	544.0 (20)
34	502.3 (24)	481.0 (25)	491.4 (49)	478.2 (17)	462.2 (18)	470.0 (35)	507.1 (7)	499.1 (11)	502.2 (18)
33	445.0 (19)	446.4 (22)	445.7 (41)	422.5 (10)	408.5 (10)	415.5 (20)	447.5 (2)	443.9 (9)	444.5 (11)
32	414.8 (21)	423.6 (21)	419.2 (42)	383.9 (9)	390.3 (29)	388.8 (38)	411.0 (5)	419.0 (5)	415.0 (10)
31	379.3 (7)	375.7 (14)	376.9 (21)	343.6 (11)	342.8 (16)	343.1 (27)	395.0 (3)	375.0 (2)	387.0 (5)
30	355.0 (7)	345.0 (9)	349.4 (16)	315.4 (38)	312.7 (43)	314.0 (81)	370.0 (3)	368.6 (7)	369.0 (10)
29	305.0 (3)	320.0 (11)	316.8 (14)	285.5 (33)	280.5 (44)	282.6 (77)	350.0 (1)	323.6 (7)	326.9 (8)
28	285.0 (1)	280.0 (1)	282.5 (2)	245.0 (16)	254.2 (32)	251.1 (48)	282.5 (2)	285.0 (4)	284.2 (6)
27	205.0 (1)	256.7 (3)	243.8 (4)	235.4 (13)	230.8 (26)	232.3 (39)	285.0 (2)	266.7 (6)	271.3 (8)
26	.. ..	.. ..	.. ..	191.3 (8)	201.0 (24)	198.6 (32)	237.5 (2)	245.0 (2)	241.3 (4)
25	195.0 (1)	175.0 (1)	185.0 (2)	180.4 (12)	182.8 (16)	181.8 (28)	210.0 (1)	.. ..	210.0 (1)
24	160.0 (2)	.. ..	160.0 (2)	170.7 (15)	170.2 (23)	170.4 (38)	180.0 (1)	215.0 (1)	197.5 (2)
23	.. ..	.. ..	.. ..	145.9 (16)	147.5 (24)	146.9 (40)	.. ..	.. ..	.. ..
22	.. ..	.. ..	.. ..	129.2 (18)	125.4 (13)	127.6 (31)	.. ..	.. ..	.. ..
21	.. ..	125.0 (1)	125.0 (1)	110.0 (8)	112.2 (9)	111.2 (17)	.. ..	.. ..	.. ..
20	.. ..	.. ..	.. ..	97.9 (12)	100.0 (9)	98.8 (21)	.. ..	.. ..	.. ..
19	.. ..	.. ..	.. ..	83.3 (3)	87.5 (4)	85.7 (7)	.. ..	.. ..	.. ..
18	.. ..	.. ..	.. ..	72.5 (2)	73.3 (3)	73.0 (5)	.. ..	.. ..	.. ..
17	.. ..	.. ..	.. ..	70.0 (1)	65.0 (5)	65.8 (6)	.. ..	.. ..	.. ..
16	55.0 (1)	.. ..	55.0 (1)	58.3 (3)	57.5 (2)	58.0 (5)	.. ..	.. ..	.. ..
15	.. ..	.. ..	.. ..	50.0 (1)	.. ..	50.0 (1)	.. ..	.. ..	.. ..
Number	.. (153)	.. (178)	.. (*331*)	.. (317)	.. (421)	.. (*738*)	.. (66)	.. (121)	.. (*187*)

[1]) Number weighed in brackets.

[1]). July—August 1927.

♀+♂	Lónsvík ♀	Lónsvík ♂	Lónsvík ♀+♂	Hjeradsflói ♀	Hjeradsflói ♂	Hjeradsflói ♀+♂	Skjálfandi Bay ♀	Skjálfandi Bay ♂	Skjálfandi Bay ♀+♂	Length in cm.
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	57
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	56
.. ..	2350.0 (1)	.. ..	2350.0 (1)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	55
.. ..	2235.0 (1)	.. ..	2235.0 (1)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	54
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	53
.. ..	1800.0 (1)	.. ..	1800.0 (1)	.. ..	.. ..	.. ..	1470.0 (1)	.. ..	1470.0 (1)	52
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	51
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1650.0 (1)	.. ..	1650.0 (1)	**50**
.. ..	.. ..	1550.0 (1)	1550.0 (1)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	49
.. ..	1395.0 (1)	.. ..	1395.0 (1)	.. ..	.. ..	.. ..	1535.0 (1)	.. ..	1535.0 (1)	48
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1346.7 (3)	.. ..	1346.7 (3)	47
1215.0 (1)	1255.0 (1)	.. ..	1255.0 (1)	.. ..	.. ..	.. ..	1420.0 (1)	.. ..	1420.0 (1)	46
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	45
.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1200.0 (3)	.. ..	1200.0 (3)	44
1047.5 (4)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	1090.0 (1)	840.0 (1)	965.0 (2)	43
930.0 (1)	.. ..	940.0 (1)	940.0 (1)	.. ..	.. ..	.. ..	950.0 (1)	.. ..	950.0 (1)	42
816.7 (3)	.. ..	810.0 (1)	810.0 (1)	.. ..	.. ..	.. ..	993.3 (3)	.. ..	993.3 (3)	41
790.0 (4)	905.0 (1)	.. ..	905.0 (1)	.. ..	.. ..	.. ..	850.0 (3)	718.3 (3)	784.2 (6)	**40**
753.8 (8)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	670.0 (3)	723.3 (3)	696.7 (6)	39
670.0 (13)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	659.0 (5)	633.3 (3)	649.4 (8)	38
623.0 (22)	.. ..	.. ..	.. ..	595.0 (1)	590.0 (3)	591.3 (4)	635.6 (8)	633.6 (7)	634.7 (15)	37
574.5 (21)	.. ..	585.0 (1)	585.0 (1)	561.7 (3)	560.0 (1)	561.3 (4)	577.0 (10)	564.5 (10)	570.8 (20)	36
533.8 (30)	.. ..	.. ..	.. ..	516.4 (7)	498.8 (8)	507.0 (15)	523.3 (6)	530.0 (16)	528.2 (22)	35
483.0 (23)	430.0 (1)	442.5 (2)	438.3 (3)	460.5 (11)	473.3 (3)	463.2 (14)	491.7 (12)	481.5 (10)	487.0 (22)	34
442.3 (28)	375.0 (1)	396.3 (4)	392.0 (5)	444.0 (5)	428.5 (13)	432.8 (18)	445.8 (6)	457.5 (10)	453.1 (16)	33
402.3 (26)	395.0 (3)	412.5 (4)	405.0 (7)	397.4 (17)	396.6 (19)	396.9 (36)	401.0 (5)	415.0 (9)	410.0 (14)	32
365.3 (18)	.. ..	361.5 (10)	361.5 (10)	382.4 (17)	359.1 (20)	369.7 (37)	390.8 (6)	392.5 (6)	391.7 (12)	31
330.3 (18)	300.8 (6)	317.5 (8)	310.4 (14)	331.3 (24)	324.4 (27)	327.6 (51)	340.0 (2)	343.0 (5)	342.1 (7)	**30**
309.7 (15)	278.3 (6)	286.7 (12)	283.9 (18)	290.5 (21)	290.3 (34)	290.4 (55)	.. ..	313.8 (4)	313.8 (4)	29
263.3 (9)	270.8 (6)	262.5 (4)	267.5 (10)	270.9 (17)	263.4 (16)	267.3 (33)	.. ..	.. ..	.. ..	28
247.2 (9)	232.5 (2)	243.0 (10)	241.3 (12)	242.8 (16)	245.0 (15)	243.9 (31)	.. ..	270.0 (1)	270.0 (1)	27
222.9 (14)	218.3 (3)	229.0 (5)	225.0 (8)	206.7 (18)	215.4 (14)	210.5 (32)	250.0 (1)	.. ..	250.0 (1)	26
201.9 (16)	185.0 (1)	210.0 (2)	201.7 (3)	188.3 (9)	188.0 (10)	188.2 (19)	210.0 (1)	210.0 (1)	210.0 (2)	25
173.2 (11)	.. ..	167.5 (2)	167.5 (2)	158.8 (4)	177.1 (7)	170.5 (11)	.. ..	.. ..	.. ..	24
155.6 (9)	.. ..	.. ..	.. ..	.. ..	150.0 (1)	150.0 (1)	.. ..	.. ..	.. ..	23
136.9 (16)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	22
115.6 (9)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	21
105.4 (13)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	**20**
86.0 (5)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	19
75.0 (4)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	18
63.8 (4)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	17
65.0 (1)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	16
45.0 (3)	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	.. ..	15
.. (*358*)	.. (35)	.. (67)	.. (*102*)	.. (170)	.. (191)	.. (*361*)	.. (83)	.. (89)	.. (*172*)	

Bibliography.

Fiskeri-Beretning. Landbrugsministeriet. Kjøbenhavn 1891—1906.

Bulletin Statistique des Pêches Maritimes. Conseil permanent internat. pour l'Exploration de la Mer. Vol. I—XVI. 1906—1928.

Sea Fisheries Statistical Tables. Fisheries — England and Wales. Ministry of Agriculture and Fisheries. For the years 1906—1926. London 1908—1927.

Atkinson, G. T. An Experiment in the Transplantation of Plaice from the Barents Sea ("White Sea") to the North Sea. Journal of the Marine Biological Association 1910.

Blegvad, H. Om Rødspættebestandens Fornyelse i den egentlige Østersø. Beretning fra "Den danske biologiske Station", XXXII. København 1926.

— Om de aarlige Vekslinger i Rødspættebestandens Alderssammensætning. Ibid. XXXIII. København 1927.

Borley, J. O. A Comparison of the Condition of the Plaice of Different Regions as to Weight. Internat. Fishery Invest. Mar. Biol. Assocn. Report IV. (Southern Area). (Cd. 6125). 1912.

— and Thursby-Pelham, D. E. Report on the English Plaice Investigations in the North Sea, during the years 1921—1923. Fishery Investigations. Series II. Vol. VII. No. 6. 1924. London 1925.

Bowman, A. Fish of the Moray Firth. Report of the Committee appointed by the Council to consider the question of the closure of the Moray Firth to Trawling. Paper No. 5. Rapports et Procès-Verbaux. Vol. LII. 1928.

Brook, G. The Spawning Period of the British Food Fishes. 4th. Scott. Fishery. Report. 1886.

Buchanan-Wollaston, H. J. Report on the Spawning Grounds of the Plaice in the North Sea. M.A.F. Fishery Investigations. Ser. II. Vol. II. 4. 1915.

Bückmann, Ad. Vorwiegen des Jahrgangs 1922 im Schollenbestande der Deutschen Bucht. Journal du Conseil. Vol. II. 1927.

Cunningham, J. T. The Natural History of the Marketable Marine Fishes of the British Islands. London. 1896.

— On the Peculiarities of Plaice from Different Fishing Grounds. Journ. Mar. Biol. Ass. IV. 1897.

Duncker, G. Variation und Verwandtschaft von *Pleuronectes flesus* L. und *P. platessa* L. Wissenschaftl. Meeresuntersuchungen. Neue Folge. I. 2. Kiel und Leipzig 1896.

— Über einige Lokalformen von *Pleuronectes platessa* L. Mitteilungen aus dem Naturhistorischen Museum. XXX. Hamburg 1913.

— Die Korrelation zwischen Länge und Gewicht bei Fischen. Wissenschaftl. Meeresuntersuchungen. Neue Folge. XV. Helgoland, Heft 1. 1923.

Ehrenbaum, E. Die Laichverhältnisse von Scholle und Flunder. Wissenschaftl. Meeresuntersuchungen. Neue Folge. IX. Helgoland Heft 2. 1910.

— Die Plattfischlarven der Nordsee und benachbarter Gewässer nach Zeit und Ort ihres Vorkommens. Rapports et Procès-Verbaux du Conseil international pour l'Exploration de la Mer. Vol. XIII. Copenhague 1911.

Faber, Friedrich. Naturgeschichte der Fische Islands. Frankfurt a. M. 1829.

Fulton, T. W. Observations on the Reproduction, Maturity and sexual Relations of the Food Fishes. 10th. Scott. Fishery Report. III. 1892.

Gemzøe, K. J. Fiskeriundersøgelser ved Færøerne og Island i Sommeren 1904. Fiskeri-Beretning for 1903—1904. Kjøbenhavn 1905.

Hefford, A. E. Report on Sexual Differentiation in the Biology and Distribution of Plaice in the North Sea. Fisheries Investigations, Series II. Vol. III. No. 2. 1916.

Heincke, Fr. Bericht über die Untersuchungen der Biologischen Anstalt auf Helgoland. Die Beteiligung Deutschlands an der Internat. Meeresforschung. IV—V. 1908.

— und Henking, H. Über Schollen und Schollenfischerei in der Südöstlichen Nordsee. Ibid. Anhang. 1907.

Holt, E. W. L. Survey of Fishing Grounds, west Coast of Ireland, 1890—91: On the Eggs and larval and post-larval Stages of Teleosteans. Scient. Transact. Royal Dublin Society. Vol. V. (Ser. II). Dublin 1893.

— North Sea Investigations. Journal Mar. Biol. Assoc. N. S. III. 1893—95.

Hubbs, C. L. Variations in the number of Vertebræ and other meristic characters of Fishes correlated with the temperature of water during development. The American Naturalist. Vol. LVI. 1922.

— Seasonal Variation in the number of vertebræ of Fishes. Papers of the Michigan Academy of Science, Arts and Letters. Vol. II. 1922.

Jensen, Aage, J. C. An Investigation of the Stock of Plaice in the Southern Horns Reef Area in the Years 1925 and 1927. Meddel. Kommissionen for Havundersøgelser. Serie: Fiskeri. Bind VIII. No. 6. 1928.

Jessen, K. Fiskeriundersøgelser ved Island. "Fiskeriberetning for Aaret 1908" ved F. V. Mortensen. København 1909.

Johansen, A. C. Beretning om Undersøgelser vedrørende Fiskeriforholdene under Skonnerten "Diana"s Togt til Islands Syd- og Østkyst i Aarene 1898—1900. Fiskeri-Beretning for 1901—1902. 1903.

— Contributions to the Biology of the Plaice I. Meddel. Kommissionen for Havundersøgelser. Serie: Fiskeri. Bind I. No. 2. 1905.

— Contributions to the Biology of the Plaice. III. On the Variation in Frequency of young Plaice in Danish Waters in 1902—1907. Ibid. Bind III. No. 4. 1908.

— Bericht ueber die dänischen Untersuchungen ueber die Schollenfischerei und den Schollenbestand in der oestlichen Nordsee, dem Skagerak und dem noerdlichen Kattegat. Ibid. Bind III. No. 8. 1910.

— Om Rødspætten og Rødspættefiskeriet i Beltfarvandet. Skrifter. Kommissionen for Havundersøgelser. No. 7. København 1912.

— On the Density of the young Plaice Population in the eastern part of the North Sea and the Skagerak in pre war and in post war years. Meddel. Kommissionen for Havundersøgelser. Serie: Fiskeri. Bind VI. No. 8. 1922.

— and Krogh, A. The influence of temperature and certain other factors upon the rate of development of the eggs of fishes. Publications de circonstance No. 68. Conseil permanent internat. pour l'Exploration de la Mer. Copenhague 1914.

Keilhack, Ludwig. Rassen-Untersuchungen an Nordsee-Schollen. Wissenschaft. Meeresuntersuchungen. Neue Folge. X. Helgoland. Heft 2. 1913.

Kyle, H. M. Contributions towards the Natural History of the Plaice. Rep. Fish. Board Scotland. XVIII. 1900.

McIntosh, W. C. and Masterman, A. T. The Life-Histories of the British Marine Food-fishes. London. 1897.

Masterman, W. S. Report Plaice Fisheries of the North Sea. Vol. I. Special Statistics. — Size and Weight (Cd. 4227). 1908. Ibid. Vol. II. (Cd. 4738). 1909.

Nordgaard, O. Beretning om Forsøk med Utklækking av Guldflyndre. Kgl. Norske Vidensk. Selsk. Skr. 1913.

Otterstrøm, C. V. Fiskeriundersøgelser ved Færøerne og Island i Sommeren 1903. "Fiskeri-Beretning" 1902—1903. Kjøbenhavn 1904.

Petersen, C. G. Joh. Om Rødspætte-Bestandens Forhold til Nutidens stærke Fiskeridrift i Bælthavet og andre Farvande. Beretning fra "Den danske biologiske Station". XXVII. 1920.

Petersen, C. G. Joh. Om Rødspættebestanden og Rødspættefiskeriet i forskellige Vande. Ibid. XXIX. 1922.

— Om Fiskeriets Indflydelse paa Rødspættebestanden i Østersøen i de seneste Aar. Ibid. XXXI. 1925.

Redeke, H. C. Bericht ueber die Hollaendische Schollenfischerei und ueber die Naturgeschichte der Scholle in der suedlichen Nordsee. Verhandelingen uit het Rijksinstituut voor het Onderzoek der Zee. Tweede deel. 1909.

— Ueber den gegenwaertigen Stand unserer Kenntnis von den Rassen der wichtigsten Nutzfische. II. Rapp. et Procès-Verbaux. XXII. 1915.

Schmidt, Johs. Marking Experiments on Plaice and Cod in Icelandic Waters. Meddel. fra Kommissionen for Havundersøgelser. Serie: Fiskeri. Bind II. No. 6. 1907.

— The Distribution of the Pelagic Fry and the Spawning Regions of the Gadoids in the North Atlantic from Iceland to Spain. Rapports et Procès-Verbaux du Conseil international pour l'Exploration de la Mer. Vol. X. 1909.

— Racial Investigations. I, II, III, V, VII. Comptes-rendus. Laboratoire Carlsberg. Vol. XIII, 3, 1917; XIV, 1, 1917; XIV, 5, 1919; XIV, 9, 1920; XIV, 15, 1921.

Smith, Kirstine. Investigations of Plaice from the western Baltic. June 1921—August 1922. Meddel. fra Kommissionen for Havundersøgelser. Serie: Fiskeri. Bd. VII. No. 2. 1923.

Spärck, R. Preliminary Survey of the results of quantitative bottom investigations in Iceland and Faroe waters 1926—27. Rapports et Procès-Verbaux. LVII. 1929.

Strodtmann, S. Laichen und Wandern der Ostseefische. II. Wissenschaftliche Meeresuntersuchungen. N. F. VII. Abt. Helgoland. 1906.

— Untersuchungen über Ostseefische. Die Beteiligung Deutschlands an der internationalen Meeresforschung. IV—V. Jahresbericht 1908.

— und Langhammer, H. Untersuchungen über die Scholle in der westlichen Ostsee. Berichte der deutschen wissenschaftlichen Kommission für Meeresforschung. N. F. Bd. 1. Berlin 1925.

Sæmundsson, Bj. Oversigt over Islands Fiske. Skrifter. Kommissionen for Havundersøgelser. No. 5. København 1908.

— Continued Marking Experiments on Plaice and Cod in Icelandic Waters. Meddel. fra Kommissionen for Havundersøgelser. Serie: Fiskeri. Bind IV. No. 6. 1913.

— Fiskarnir. Íslensk Dýr I. Reykjavik. 1926.

Thursby-Pelham, D. E. Fluctuations in the Age Composition of the Plaice Stock in the Southern North Sea during the Period 1923 to 1926. Journal du Conseil. II. 1927.

— Report on English Plaice Investigations 1924 and 1925. Fishery Investigations. S. II. Vol. X. No. 3. 1927. London 1928.

Trybom, F. Trawlfiskeförsök i Östersjön ock Notiser om Rödspättans lek dästädes. Svensk Fiskeri-Tidsskrift. 1903. p. 49 flg.

Tåning, Å. V. Contributions to the Life-History of the Icelandic Plaice. Rapports et Procès-Verbaux du Conseil Internat. pour l'Exploration de la Mer. Vol. XXXIX. 1926.

— Directions for staining fish with a view to racial investigations. Journal du Conseil. Vol. II. 1927.

Wallace, W. Report on the Age, Growth and Sexual Maturity of the Plaice in certain Parts of the North Sea. (Fishery Investigations. Series II, Vol. II, 1914). 1915.